The Habits of a Lifetime?
Babies' and Toddlers' Diets and Family Life in Scotland

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Declaration of own work

I declare that this doctoral thesis is entirely my own work and has not been submitted and has not been submitted for any other degree or qualification.

Signature Date

______________________ _________________

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~

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Abstract

Scotland has the highest rates of child obesity in Europe with more than 1 in every 4 children aged between 2 and 15 being overweight or obese in 2008. The need to curb the nation's unhealthy eating habits through Scottish public health policy has been acknowledged, although there remains a shortage of policy addressing the eating habits of infants and young children as they develop in the context of family life. This is matched by a shortage of empirical research which uses nationally representative longitudinal data on Scottish children, to look at how diets of children under five develop within the home.

This doctoral research seeks to explain how children's nutritional trajectories develop from birth through infancy and into early childhood in contemporary Scotland within the context of maternal resources, maternal use of nutrition advice, and family meal habits. Theoretical concepts pertaining to social constructionism and the symbolic meaning of meal rituals, as well as theories of risk and responsibilisation, human capital and health behaviours, and discussions about agency and structure, frame the research questions and the interpretation of results. The research draws on the first three annual sweeps of the Growing Up in Scotland nationally representative, longitudinal survey of families and young children. The analysis is based on multivariate proportional hazards regression and logistic regression models.

The empirical analysis shows that maternal education is a consistently superior predictor of children's nutritional outcomes, when compared to maternal occupational classification and household income, and that children of more educated mothers have healthier diets throughout infancy and childhood. This points to the utility of human capital theories which stress the importance of education, rather than income, and also reflects on the need for policy to recognise the structural nature of nutritional inequalities. More educated mothers are also more likely to be proactive in using healthy eating advice, resonating with theories of risk awareness and medicalised childhoods. Surprisingly, mothers from disadvantaged backgrounds

are more likely to use advice from health professionals, possibly as a result of health professionals actively targeting their support to more ‘at risk’ families. Yet these mothers are also more apprehensive about the interference of health professionals in aspects of childrearing. Relevant policy reflections pointed to the need to identify how support for mothers from more disadvantaged backgrounds can be provided in formats which help to overcome the culture of mistrust towards health professionals prevalent among disadvantaged parents.

Nevertheless, positive associations between infant diet and maternal use of breastfeeding advice from health professionals are found, in line with theories of power-knowledge, lending support to information-based policy initiatives as a tool for improving infant nutrition. The analysis also indicates that children who are breastfed, and children who are weaned later have healthier diets in their toddler years, which contributes to the proposal of a theoretical typology explaining how young children’s nutritional trajectories evolve from the pre-partum period through infancy and childhood. Finally, the analysis suggests that communal patterns of eating play an important role in children’s dietary quality, attesting to the importance of the meal ritual as a vehicle for socialising children into developing particular tastes for food. Thus, there seems to be room for policy initiatives which address not only *what* children eat, but *how* young children and families eat in the context of everyday family life.

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List of Abbreviations

ALSPAC	- Avon Longitudinal Study of Parents and Children
CRFR	- Centre for Research on Families and Relationships
DWP	- Department of Work and Pensions
ESRC	- Economic and Social Research Council
FSA	- Food Standards Agency
GUS	- Growing Up in Scotland
HR	- Hazard Ratio
IFS	- Infant Feeding Survey
LCF	- Low Costs and Food survey
LIDNS	- Low Income Diet and Nutrition Survey
MCS	- Millennium Cohort Study
MLE	- Maximum Likelihood Estimation
NDNS	- National Diet and Nutrition Survey
OLS	- Ordinary Least Squares
OR	- Odds Ratio
ScotCen	- Scottish Centre for Social Research
SDAP	- Scottish Diet Action Plan
WHO	- World Health Organisation

Introduction

"The human animal is adapted to, and apparently can thrive on, an extraordinary range of different diets, but the Western diet, however you define it, does not seem to be one of them." (Pollan, 2008)

Currently in Europe, 1 in 2 adults and 1 in 7 children are overweight or obese (OECD, 2010).

In 2008 in Scotland, more than 1 for every 4 children aged 2 to 15 years of age was either overweight or obese (National Obesity Observatory, 2010).

By 2050, 60% of men and 50% of women in the UK will be clinically obese (Butland et al., 2007).

It is perplexing to think that modern society is, on the one hand, responsible for unthinkable advances in medical sciences which favour longer and better lives for individuals and, on the other hand, also responsible for creating and sustaining a system of food production, supply and consumption that undermines the health and wellbeing of those same individuals. While an increasingly industrialised mode of food production and supply may in part be the cause of the rise and growth of Western civilisations, some would argue this will also be the reason for their demise (Rimas and Fraser, 2010).

The increasingly worrying prevalence and future forecasts of morbidity and mortality rates caused by *over*-nutrition seem to confirm these fears (Butland et al., 2007). In Europe, Scotland tops the list of offenders with the highest rates of obesity and overweight among adults and children in Europe. In 2008, 27% of the adult Scottish population were obese lagging behind only the United States (34%) and Mexico

(30%) on a global front. Analogous problems have arisen among children in Scotland, with about 28% of boys and girls aged 2-15 years of age in Scotland being either overweight or obese in 2008, and Scotland lagging behind the United States, Mexico and Canada on the child obesity front (National Obesity Observatory, 2010).

The above facts help to illustrate why Scotland is a nation of particular interest with regard to research on child nutrition and health. The Scottish Government, originally known as the Scottish Executive, was established in 1999 following the Scottish devolution referendum in 1997 and the subsequent passing of the Scotland Act 1998. The devolved government is currently responsible for developing and implementing policy in health care, education, justice, rural affairs, and transport in Scotland, and is accountable to the Scottish Parliament (http://www.scotland.gov.uk/About/ accessed 01/Jan/2011). The UK government is still responsible for national policy on all non-devolved issues, including foreign affairs, defence, social security, and trade (http://www.direct.gov.uk/en/Governmentcitizensandrights/UKgovernment/Devolvedgovernment/ accessed 01/Jan/2011). In light of the devolved nature of Scottish governance, this thesis reflects primarily on Scottish policy developments following devolution. In the subsequent chapters, Scotland will be referred to as a 'nation' while the term 'state' will be used to refer to the UK as whole.

Devolved Scottish Government has acknowledged the need to take action in curbing the nation's appetite, with relevant policy action accumulating over the last two decades (Scottish Executive, 2000; Scottish Executive, 2003b; Scottish Government, 2007; Scottish Government, 2008b; Scottish Office, 1993; Scottish Office, 1996; Scottish Office, 1999a; Scottish Office, 1999b). This has been reflected in a rising concern about nutrition related illnesses at an international level (WHO, 2000; WHO, 2003b; WHO, 2004; WHO, 2007; WHO, 2008). In general terms, policy at a Scottish and international level has gradually come to recognise the importance of addressing the nutritional habits of children, separately from those of adults. However, policy developments have been primarily concerned with either the nutrition of infants, and particularly with breastfeeding (Breastfeeding in Scotland etc. Act 2005; Scottish Executive, 2006a; WHO, 1990; WHO, 2003b), or with the nutrition of school-aged children (Final Report of the Expert Panel on School Meals, 2003; MacLardie et al., 2008). This has resulted in the virtual absence of public health initiatives which explicitly address the nutrition of children in the early years period after children move on from a milk-based diet, but before they enrol in schools or institutional care-settings.

This policy silence with regard to the nutrition of children in the early years may have something to do with a reluctance for public health policy to interfere with matters which may be identified as strictly ‘off-limits’, such as parental choices regarding children’s diets. However, considering how public health policy has been vociferous on equally private family matters, such as maternal decisions on breastfeeding, policy-shyness is unlikely to be the cause of the current relative shortage of attention to nutrition in the early years period. In some respects, the relative shortage of empirical research evidence on children’s nutritional habits in the very early years has not helped to push early years nutrition up on the policy agenda, as is discussed in further depth in this thesis.

In fact, the vast body of empirical research literature on child nutrition has either focused on breastfeeding and weaning, often using administrative sources of data or very small samples, or has alternatively focused on the eating habits of older children, typically of school-age, when many food preferences and eating habits are already established (Jebb et al., 2007). More research on how children’s nutritional trajectories evolve through early experiences of nutrition at birth, in infancy and the toddler years could provide a much needed insight into how these early food experiences shape children’s food preferences in later childhood and adult life. Perhaps such research could inform public health policy about when the optimal time is to intervene in improving the eating habits of the population, and whether there are stages in early childhood when *prevention* strategies would be most appropriate. These could perhaps complement the existing portfolio of primarily *treatment* strategies which aim to change the already poor nutritional habits of older children and adults.

Contextualising this Doctoral Research

Some general information regarding the set-up and funding for this doctoral research may help to contextualise the work to be presented in this thesis. In 2006, I was awarded an Economic and Social Research Council CASE 1+3 MSc and PhD studentship to look at child nutrition in the early years period. As a postgraduate student I have been based at the Centre for Research on Families and Relationships (CRFR), and affiliated to the School of Social and Political Studies at the University of Edinburgh. My studentship was set up in collaboration with the Scottish Centre for Social Research, a non-academic partner offering external support and supervision during the course of my postgraduate studies.

The Scottish Centre for Social Research (ScotCen), is the Scottish arm of the National Centre for Social Research, and is responsible for, among other things, the design and data collection of the Growing Up in Scotland survey (GUS). The GUS survey is a longitudinal national survey of children and families in Scotland, which collects information on different aspects of children's development in the very early years. My studentship was set-up specifically to capitalise on the vast amount of data collected through the GUS survey, focusing particularly on the nutrition and eating habits of infants and young children in the context of family life.

There are several aspects of this studentship which make it unique. Firstly, PhD projects set-up in collaboration with external non-academic partners are rare in the social sciences. This doctoral research project is thus distinctive for adopting a model for research more commonly associated with computer science and the natural sciences. Second, the funding agreement for the PhD also included three 1-month internships with ScotCen which I undertook at yearly intervals throughout the course of the PhD. During these internships I was able to gain work experience and an insight into the way a survey-organisation tenders for, collects, manages and reports on large quantitative surveys. I also had the opportunity to co-author one of the official reports drawing on annual results of the GUS survey (Marryat et al., 2009). Thirdly, I was involved in discussions regarding the improvement of future design and data collection plans for the GUS survey, both through informal conversations with staff at ScotCen, and through formal participation in user-group consultation meetings arranged by ScotCen.

Official reports of GUS data produced by ScotCen have been primarily descriptive, as is the nature of such reports. This doctoral research has pursued a more in-depth analytical enquiry, using more elaborate multivariate regression techniques, and drawing to a greater degree on empirical research and social theory to make inferences and interpretations about the lives of children and families living in Scotland. Thus, while the research carried out in this thesis could be strictly classified as 'secondary analysis' of survey data, the term 'secondary' fails to reflect the uniqueness of this project which sets forth the first essentially 'primary analysis' of GUS data.

MSc Thesis Using GUS Data

The MSc by research component of this studentship was undertaken between 2006 and 2007. As the subsequent PhD was to focus on child nutrition in the early years, it was seen fit that the MSc thesis could start off with an analysis of trends in breastfeeding take-up using GUS data. Some of the findings from the MSc thesis were published in the Public Health Nutrition journal (Skafida, 2009), and an author-created version of the article has been attached in Appendix B [for access to full paper use doi:10.1017/S136898000900494]. Given this prior research, this doctoral thesis does not focus on breastfeeding take-up, but looks extensively at breastfeeding duration, weaning, and eating habits in children under five years of age.

Research Aims and Questions

The aim of this research is to understand and explain how children's nutritional trajectories develop from birth through infancy and early childhood in contemporary Scotland within the context of family habits and routines. As such, this research will focus primarily on the period of early childhood which has thus far been largely overlooked by existing research. It is hoped this study will distinguish itself from the overwhelming amount of medical empirical research on child nutrition by paying extensive attention to the contextual and social nature of eating, and by drawing on relevant social theories of human health behaviours to interpret research findings. The research enquiry is driven by five key research questions:

Q.1 Do parents with more human capital help to cultivate physical capital in their children by making healthy nutrition choices?

Using an amalgamation of the concepts of capital introduced by Becker (Becker, 1993) and by Bourdieu (Bourdieu, 1984), this question aims to explore how parental, and particularly maternal human capital, captured primarily by indicators of maternal occupational status, maternal educational qualifications, and parental income, influences children's nutritional outcomes at birth, in infancy and in the early years period.

Q.2 Does maternal human capital explain differences in maternal attitudes towards the involvement of health professionals in aspects of childrearing and child nutrition?

This question builds on from the preceding one and explores whether maternal human capital explains maternal use of advice on healthy eating and differences in attitudes towards the involvement of health professionals in aspects of childrearing and child nutrition. Of particular interest are the different sources of information and advice which parents use for advice on healthy eating, and the theoretical distinction between 'formal' sources, such as health professionals, and 'informal' sources of advice, such as family and friends.

Q.3 How does maternal knowledge of, and use of, nutrition advice relate to infants' and toddlers' diets?

This question is coloured by a broader interest in policy evaluation research and explores how maternal knowledge of healthy eating, and maternal use of different sources of advice on nutrition relates to children's experiences of breastfeeding, the introduction of solid foods, and eating habits in the toddler years.

Q.4 Do children's nutritional trajectories from birth through infancy relate to their tastes for food in the early childhood period?

It is proposed that children embark on different nutritional trajectories from birth, and these may determine their food preferences in early childhood. This question focuses on the extent to which early experiences of nutrition at birth, such as breastfeeding and weaning, predict children's nutritional patterns in toddlerhood.

Q.5 Do children develop a 'taste' for certain diets through their early childhood experiences of family meal rituals?

Finally, eating habits are understood to be socially constructed habits which children are socialised into from birth through family-based food experiences. This question aims to tease out the extent to which the eating patterns and meal habits of the family as a whole explain how children come to develop their nutritional preferences in early childhood in the context of family life.

Thesis Outline

Chapter 1 in this thesis reviews the empirical research literature which has looked at children's nutritional habits in the early years period. Chapter 2 provides a critical appreciation of key relevant policy developments which have addressed the nutrition and health of infants and young children, starting with a brief introduction of international policy and a more comprehensive introduction of Scottish policy on infant and child nutrition. Given the relative shortage of sociological and theoretically informed empirical research on child nutrition, chapter 3 introduces the key theoretical pillars which guide the research enquiry and interpretation of results in this thesis. Chapter 4 commences with a discussion about the relevant research methodology, followed by an introduction of the Growing Up in Scotland data and the operationalisation of key concepts used in the research.

Chapter 5 is the first of four substantive chapters, and is largely focused on the relationships between maternal human capital and children's nutrition, addressing the first research question. Chapter 6 addresses the second research question, and looks at the relationships between maternal human capital and maternal use of different sources of advice on childrearing and child nutrition. Chapter 7 looks at whether maternal use of different sources of nutrition advice predict children's nutritional outcomes, addressing the third research question. The final two research questions are addressed in chapter 8, which explores children's nutritional trajectories over time and the relationships between family meal habits and children's dietary quality. The Conclusion at the end of the thesis distils the key ideas and findings emerging from the doctoral research to reflect upon the set five research questions.

CHAPTER 1
Review of Empirical Research Literature

Introduction

The central aim of this thesis is to explore how children's eating habits develop from infancy through early childhood and how these eating habits are related to maternal human capital, maternal use of nutrition advice and family meal habits. This chapter provides a review of the relevant empirical research literature which informed the research process and the interpretation of subsequent results.

The approach adopted in reviewing relevant literature for the thesis adopted some of the strategies typically used in systematic literature reviews, but it was not originally set out to produce a systematic review per se, and data saturation rather than data comprehensiveness guided the review process (Petticrew and Roberts, 2006). The databases PubMed, JSTOR, ISI Web of Knowledge, Emerald, ScienceDirect, and IBSS, were searched on several occasions during the course of the research between Oct 2007 and Dec 2010. The key search terms which were used are outlined below, categorised under the sections: a) breastfeeding and weaning, b) child nutrition, c) social determinants, d) maternal employment, and e) health advice. Several combinations of terms and their derivatives (e.g. breastfeeding, breastfed) were used when searching each database. The search of breastfeeding literature was filtered to exclude papers using data from developing countries which tended to focus on the link between breastfeeding and communicable diseases.

Search terms used

a) breastfeeding and weaning:

breast feeding, breastfeeding duration, lactation, formula, bottle-fed, infant feeding, infant nutrition, infant diet, weaning, solid food, solids,

b) child nutrition:

children's diet, children, early years, toddlers, pre-school, childhood, consumption, vegetables, fruit, healthy eating, eating habits, meal, food, food choices, food preferences, taste conditioning, food acceptance,

c) social determinants:

social determinants, social class, human capital, socio-economic, occupation, income, education, social capital, health inequalities, maternal characteristics, parenting, familial, socio-demographic, social patterning, low income, poverty, lone-parents, single parents,

d) *maternal employment*:

work, employment, maternity leave, labour market, working mothers

e) health advice:

health advice, help, information, pregnancy advice, antenatal classes, healthy eating, health professionals, feeding decisions, health behaviours, intervention programmes, food skills, cooking skills, cooking knowledge

Initial results were also searched further to identify studies which were carried out using Scottish or UK samples, and to identify studies which were based on survey data, national samples, or which used longitudinal data. Further literature was reviewed following the examination of the reference lists of papers identified through initial database searches. This was complemented with a more ad hoc review of relevant literature where this was identified, during the course of the doctoral research, either resulting from database search alerts or from media coverage of published research. Also, particular attention was given to research emerging from cohort studies which had a survey design similar to the Growing Up in Scotland study, primarily research based on the Millennium Cohort Study, and the Growing Up in Australia study.

The first section of this chapter looks at the relationship between maternal socio-economic and educational characteristics and children's nutritional outcomes in infancy and early childhood. Literature on breastfeeding initiation will be looked at briefly, and more attention will be paid to literature looking at breastfeeding duration, especially in relation to maternal employment. Literature reviewing the timing and content of weaning diets, when children move on from milk to solid foods, will also be reviewed.

The second section looks at maternal awareness of health risks and at maternal use of advice in making decisions about childrearing. Among other things, the evidence indicates that parents use a variety of sources of advice, ranging from advice from health professionals to advice from family and friends, when making decisions about infant and child nutrition. The extent to which parents rely on health professionals rather than family and friends for advice seems to be influenced by maternal socio-economic and educational characteristics.

Children's nutritional patterns and dietary preferences are highly embedded and contingent on the nutritional patterns and life styles of the family as a whole. The third section looks at the relationship between communal family eating habits and children's eating habits. There is a vast body of empirical research literature showing that where, when and with whom children eat are important determinants of what children eat, although the majority of this research is based on older children and on qualitative research.

The fourth section reviews evidence on how children's nutritional preferences develop from infancy through the early childhood years, and how these relate to eating habits which children come to adopt as adults. A growing body of research is coming to light which is emphasising the importance of nutrition during the very early years in determining health outcomes in later childhood and adult life. Given the longitudinal nature of the thesis, a review of literature investigating the relationship between dietary patterns in infancy and then in early childhood, adolescence and adulthood is of key importance. This body of literature confirms that existing evidence is based primarily on the nutritional habits of older children, with little evidence on how nutritional trajectories evolve over time from eating experiences in infancy and early childhood. The chapter concludes with a critical overview of the shortfalls and gaps in the existing empirical research literature. It goes on to suggest how the research undertaken for this thesis aims to address these gaps.

Human Capital and Child Nutrition

A thorough analysis of the development of children's dietary habits in the early years period should account for the broader structural and cumulative cycles of disadvantage which characterise the stratification of society and often leave certain groups in society more vulnerable to poor nutrition than others. For this research, the concept of *human capital* will be defined and used to capture the amalgamation of tangible and intangible characteristics which influence children's dietary habits directly and indirectly from birth, if not before that. Human capital as a concept taps into different micro-cultures which feature different types of personal aspirations, hopes, beliefs, and social attitudes which affect health outcomes and other aspects of human behaviour. Human capital is closely linked to, although not fully explained by educational attainment, financial resources, employment and employment prospects. This concept of human capital is not dissimilar to the economic and cultural capital discussed by Bourdieu (1984), and the human capital discussed by Becker (1993), and has been conceived as an amalgamation of these concepts. A more elaborate explanation of the meaning, importance and operationalisation of this concept of human capital, and how it relates to similar concepts introduced by Becker and Bourdieu, is discussed in Chapter 3, page 81.

While human capital cannot be fully measured or captured in social research, existing empirical research on child nutrition has often used parental occupation, household income, and occasionally parental educational qualifications as *indicators* used to capture an underlying differential distribution of human capital which is assumed to be driving differences in feeding and eating habits. Thus, a review of such empirical literature which explores the importance of parental income, occupation, and educational qualifications follows below.

Income and Occupation

Numerous studies have found that breastfeeding take-up and duration is influenced by the mother's occupation and economic background (Arlotti et al., 1998; Avishai, 2007; Bailey et al., 2004; Earland et al., 1997; Hamlyn et al., 2002; Houston et al., 1983; Jeliffe and Jeliffe, 1978; Jones et al., 1986). Research has unanimously highlighted how mothers in more privileged occupational categories and in higher income groups are more likely to both initiate breastfeeding and to continue to breastfeed for longer when compared to mothers in less privileged occupational groups and those in lower income households. A few studies have also shown that the mother's education is a important predictor of breastfeeding patterns (Kelly and Watt, 2005; Ludvigsson and Ludvigsson, 2005; Martin and White, 1988; Papadimitriou et al., 2005; Power and Matthews, 1997; Scott et al., 2006).

Similarly for the introduction of solid foods, the evidence suggests that mothers from more disadvantaged backgrounds are more likely to introduce solids in their infants' diets prematurely (typically defined as before infants turn 4 months old). Until recently there was a shortage of nationally representative data on weaning practices in the UK, although the two latest sweeps of the UK Infant Feeding Survey (IFS) partly address this evidence gap (sweeps 2000 and 2005). IFS data show that mothers have started to delay weaning, in line with recommendations, but those in managerial and professional occupations are far more likely to wean later than mothers in other occupations (Bolling et al., 2007). Mothers with more educational qualifications are also more likely to postpone weaning than those with fewer qualifications, and 3 in 5 of those who leave school by 16 wean infants before 4 months, compared to 2 in 5 of those leaving school after 18 years of age. Also, among more educated mothers, the transition towards later weaning has been more marked with 19% weaning after 4 months in 2000, compared to 60% in 2005 (Bolling et al., 2007).

Much like the timing of weaning differs between social groups, the food choices made while weaning also appear to differ between different social groups. Mothers in managerial/professional occupations, for example, are less likely to give regular servings of sugary treats to their child (14%) compared to mothers who had never worked (33%) (Bolling et al., 2007). Thus, official advice on foods recommended for weaning seem to influence maternal feeding decisions, but there are still many children, and relatively more among less privileged social groups, who are weaned on a diet which includes some unhealthy sugary or salty options.

Research on low-income families and lone-parent families has revealed the severity of food-poverty in the UK, describing how many families experience and deal with the financial barriers in eating healthy food, and at times in eating at all (Dobson et al., 1994; Dowler et al., 2001). The findings reported by Dobson et al are based on a qualitative study of 48 households from a city in the UK which involved in-depth interviews and data on food expenditure and food consumption. The book by Dowler et al on the other hand was based on a comprehensive variety of data, drawing both on national surveys and smaller qualitative studies. Both sources indicate that families who might struggle financially are more likely to ration supplies, and shop alone, without children, to limit their spending. Also, they are less likely to experiment with new and perishable foods, particularly fresh fruit and vegetables, which are not popular with children and are more likely to go to waste. This means that unhealthy foods are more likely to be eaten and eating a more expensive healthy diet is often considered unfeasible.

The cost of electricity and gas necessary to use hobs and ovens is often also a problem, as well as the cost of transport to access larger supermarkets with lower prices. The data from the 2007 Expenditure and Food Survey show that lower income families buy foods higher in fat, sugar and salt and buy overall fewer vegetables and fruit than families with higher incomes. Overall, many parents on lower incomes may find that providing a sufficient quantity of food is a primary problem, and the issue of food quality inevitably becomes of secondary importance (Backett-Milburn et al., 2006; Dowler et al., 2001).

The large body of evidence on low-cost diets unanimously suggests that lower incomes are linked to poorer nutrition for families and children, which manifests itself in poorer health in childhood and adult life (Nelson, 2000; Seguin et al., 2003). During the current economic downturn, the cost barrier in pursuing a healthy diet has become increasingly more severe, and preliminary data show that the consumption of organic and healthy foods has fallen, while the consumption of fast food and convenience food, as well as the consumption of budget supermarket branded foods has risen considerably, indicating the direct effect that cost is having on many people’s diets (BBC News, 2009).

Maternal Education

The vast majority of existing empirical research seems to focus primarily on the importance of household income and maternal occupational category, linked to her employment, on children’s nutrition in infancy and early childhood. There is a growing body of evidence, however, which looks at the importance of maternal education in determining parental feeding decisions and general health behaviours. Research based on GUS data which explored the relative impact of maternal occupation and maternal education in predicting breastfeeding take-up found that maternal education was a relatively stronger predictor of breastfeeding take-up than the maternal occupational classification (Skafida, 2009). Similarly, a report based on the Scottish sample of the Millennium Cohort Study showed that maternal occupational classification, which on its own was a statistically significant predictor of breastfeeding, was no longer statistically significant when also controlling for the mother's educational qualifications in a multivariate regression model (Dex, 2008).

Apart from infant feeding, some studies have reported that maternal education is related to unhealthy diets among children. Lower vegetable consumption has been linked to lower levels of maternal education while more health-conscious diets are more common with increasing levels of education (Cooke et al., 2003; Northstone et al., 2005). But most studies looking at the importance of parental socio-economic background in family and child nutrition tend to focus on income and maternal occupation, while parental, and specifically maternal education is usually overlooked. This is a gap the current research hopes to address. Evaluating the relative importance of maternal occupational classification, household income and maternal education in explaining breastfeeding duration, the timing of weaning, and children's dietary quality is one of the aims of this thesis, addressed in chapter 5.

Children's Diet and Family Characteristics

Aside from occupation, income and education, the reviewed empirical literature also pointed to some other family characteristics which seem to influence children's diets in the early years period. Mother's age at birth, whether a mother has previous children, whether a mother is in a single-parent household and the mother's ethnic background are factors usually controlled for in the analysis of breastfeeding trends (Bolling et al., 2007; Dezateux et al., 2005; Hawkes et al., 2004; Hirschman and Butler, 1981; Joshi and Wright, 2004). Research has found that older mothers, those who have had previous children, those living in a couple-household, and those who are of non-white ethnic origins are more likely to breastfeed and continue to breastfeed for longer. Also, mothers of minority ethnic backgrounds in the UK are more likely to wean later (Bolling et al., 2007). A relatively smaller body of literature has explored the relationship between lone parent families and nutritional patterns. The research which has been carried out suggests that children of lone parents have less favourable health prospects (Angel and Worobey, 1988; Bennett, 1992; Montgomery et al., 1996), and consume smaller quantities of healthy food (Dowler and Calvert, 1995).

For many parents, one of the greatest barriers in pursuing a healthy diet is the real or perceived notion that healthy eating is resource intensive, in terms of time and money. This may be particularly true in families where both parents are working full-time, particularly in lower income families (Devine et al., 2006). Increasingly longer working hours, and commuting times also mean less time left over to prepare food made with fresh ingredients. Parents in modern families suffer a general lack of time and a lack of family time. Non-standard working schedules are becoming increasingly common, placing considerable strain on individuals, marriages and families. Additionally, the growth of a '24/7 economy' disproportionately affects the lives of the working poor due to their more limited options in the employment market, and greater likelihood of working in late or overnight shifts. Thus, for many parents, family time is hard to come by (Presser, 2003).

Breastfeeding, Employment and Maternity Leave

The conflicting demands women face in juggling motherhood and labour market participation have been well documented in empirical research (Hawkins et al., 2008; Hawkins et al., 2009; Scott et al., 2008). The detrimental effects of this conflict between work and home often take their toll on maternal career prospects, while mothers with fewer qualifications and in part-time work are those most likely to suffer from downward occupational mobility (Macran et al., 1996; Scott et al., 2008). Research has also shown that maternal labour market participation is linked to detrimental outcomes in children's health and access to healthy foods and physical activity, and that policy could improve to better enable parents to raise children in more health-promoting environments (Hawkins et al., 2008; Hawkins et al., 2009). Mothers' employment, maternity leave and maternity pay have been shown to be particularly influential in determining breastfeeding duration. Several studies have indicated that a complete appreciation of why mothers breastfeed for shorter or longer periods of time needs to take into account the importance of the mother's employment profile (Baxter, 2008; Baxter et al., 2009; Cooklin et al., 2008; Earland et al., 1997; Guendelman et al., 2009; McKinley and Hyde, 2004; Rea et al., 1997; Roe et al., 1999).

The idea that continued breastfeeding and returning to work present conflicting demands for mothers has been well researched in different countries and at different time-points. Research based on data collected in 1993 in the USA showed that maternal employment leave was a statistically significant predictor of breastfeeding duration, and that each week of work leave increased breast-feeding duration by almost half of a week (Roe et al., 1999). A similar study in Brazil also found that maternity leave and flexible working conditions had a positive impact on breastfeeding duration (Rea et al., 1997). Similar research, based on data from the Growing Up in Australia longitudinal survey is of particular interest given the survey's similarity to the Growing Up in Scotland survey. Research looking at the impact of maternal return to work and maternal employment status on breastfeeding duration at 3 and 6 months indicated that return to work was associated with a premature cessation of breastfeeding, even after controlling for maternal age, education and an index for area deprivation (Cooklin et al., 2008). Further research using the same data, found that mothers working on a flexible schedule, and mothers who were self-employed were more likely to breastfeed for longer, while those working longer hours (35 hours or more/week) were more likely to stop breastfeeding sooner (Baxter 2008). Also, controlling for socio-demographic characteristics, mothers who returned to full-time post-natal employment were more likely to wean their infants prematurely (Baxter et al., 2009).

Another study carried out on US survey data collected in 1988 found that the likelihood of giving up breastfeeding among mothers returning to work compared to non-working mothers is far greater in the first month of the child's life and decreased as the child ages (Lindberg, 1996). In essence, it is fairly unsurprising that this negative impact of employment is more pronounced in the earlier months of a child's life when breastfeeding needs to take place frequently. On the other hand, older infants, whether breastfed or not, will be gradually exposed to more varied diets including possibly formula milk or solid foods, and breastfeeding can take on a more complementary role and be more easily maintained among working as well as non-working mothers (Lindberg, 1996; Roe et al., 1999). Recently published evidence on a sample of 770 mothers based in California suggested that, adjusting for relevant covariates, mothers who did not return to work were more likely to breastfeed for longer than those who returned to work, despite having taken maternity leave of up to 12 weeks. This study also showed that women working in inflexible and non-managerial jobs were more likely to stop breastfeeding sooner if they took a short time off on maternity leave (Guendelman et al., 2009).

It is evident that the US has a fairly strong research tradition on issues regarding the balance of motherhood and employment, and the majority of existing research is based on US samples, often non-representative, most of which is now fairly dated. Thus, these studies cannot explain the context in which breastfeeding occurs in contemporary Scotland. The research presented in chapter 5 aims to address this gap in evidence and explore the relationship between maternal employment, maternity leave and breastfeeding duration in contemporary Scotland.

Parental Feeding Decisions

Perceiving Health Risks

In general terms, many public health initiatives aim to raise awareness of health risks, and advise individuals on how best to avoid such health risks through health preventative behaviours (this will be discussed in further depth in chapter 2). This also applies to the field of parental knowledge about infant and child nutrition and child health. But research shows that parents are often unaware of, or misinformed about, the actual long-term health risks caused by inadequate or suboptimal nutrition for children, particularly because many health outcomes manifest themselves after several years when children are older (Jeffery et al., 2005).

Also, in terms of identifying child obesity, parents often rely on comparisons with children's peers to assess their own child's health, which in a society with high rates of childhood obesity and overweight, can leave parents with a distorted image of what children should look like (Carnell et al., 2005; Jeffery et al., 2005). Contrary to the concerns feeding into health policy, parents are often anxious that their children will eat too little rather than too much, and this particularly applies to young children who may appear to not grow or develop as rapidly as expected. Qualitative research carried out in Scotland also found that, among older children and teenagers, parents are more concerned with problems related to smoking, alcohol, drugs and sex than problems related to diet, which tend to have a more direct and immediate health implications (Backett-Milburn et al., 2006).

Formal and Informal Advice

Parental perceptions of children's health and nutrition, and parental decisions on infant and child nutrition are influenced by a vast spectrum of advice regarding what children should or should not eat. The review of empirical literature indicated that individuals rely on both formal and informal sources of advice on various health issues (Bailey and Pain, 2008; Clarke and Gross, 2004; Neighbors and Jackson, 1984; Nicolson, 2010; Savage et al., 1998). Formal advice is usually defined in most studies as advice which claims to be evidence-based and which originates from individuals for whom providing such advice is part of their job description, such as health professionals. Such advice can come in different formats and include written media, such as NHS information leaflets, or advice provided through face-to-face interactions with health professionals such as health visitors or midwives. Research on patient satisfaction with health care in Scotland has pointed to the importance that patients place on interpersonal care and information provided by health professionals who display a genuine interest in the patient (Bikker and Thompson, 2006). Informal advice, on the other hand, is more likely to be experiential advice originating from family and friends or other significant others. The evidence suggests that parents from more disadvantaged backgrounds are less likely to rely on formal advice and more likely to use informal sources of advice to inform their health-related decisions (Clarke and Gross, 2004; Neighbors and Jackson, 1984; Savage et al., 1998).

Data from the Infant Feeding Survey show that following an increased promotion of delayed weaning by health professionals in the last decade, there has been a transition towards delayed weaning among mothers in Scotland between 2000 and 2005, with 19% weaning after 4 months in 2000, compared to 60% in 2005. Mothers who decided to wean later stated that they relied on advice from a health professional or from written information sources, and 59% of those who weaned after 5 months stated having done so, compared to 17% of those who weaned by 3 months (Bolling et al., 2007). However, the decrease in early weaning between 2000 and 2005 was overall more marked among mothers with more educational qualifications. Perhaps mothers with more advantaged socio-economic and educational backgrounds were more likely to look for and be exposed to health information and adopt practices recommended by health professionals.

Recent qualitative research (Nicolson, 2010) showed that mothers who had given birth in the 1970's were primarily reliant on advice from other family members. This was contrasted to those giving birth in the second millennium who had to also deal with additional information from doctors, midwives, books, magazines and the internet. Nevertheless, even in 'modern' motherhood, it appears that advice from family was perceived as more important than advice from medical professionals. Exploratory research looking at infant feeding decisions among a sample of mothers in Newcastle suggested that mothers' informal support networks influence how mothers access, interpret and use formal advice on breastfeeding from health professionals (Bailey and Pain, 2008).

The literature also indicated that mothers who do not follow formal advice are not necessarily *unaware* of such advice, but they may be consciously choosing to ignore it and favour informal sources of advice or their own instinct in making health related decisions. Qualitative research based on a small sample of mothers from Kirkcaldy in Fife, Scotland, (Anderson et al., 2007) found that a third of the mothers in the study, while being aware of the official weaning recommendations regarding the introduction of solids, initiated weaning sooner than recommended. These mothers felt that the introduction of solid foods was primarily baby led and that babies showed a desire to eat solid foods. Reasons for early weaning included: parents noticing a response and interest in babies after smelling food, and parents being eager to see children develop. The Glasgow Longitudinal Infant Growth Study followed a cohort of 127 infants born in 1992-93, representative of the greater Glasgow area. The data show that 93% of infants had been weaned before 4 months, despite the fact that the majority of mothers knew about the official weaning recommendations. Mothers drew on a variety of sources, from health visitors to family and friends, in decisions about weaning. However, most relied primarily on their own experiences with the child, and weaned their baby prematurely primarily because they felt the baby was still hungry, or because it could not sleep (Savage et al., 1998).

Both of the above Scotland-based studies indicate that mothers use more visible and tangible cues, such as size and weight of the baby, rather than only age, and the baby's perceived hunger, in order to determine the timing of weaning. Nationally representative data from the Infant Feeding Survey (IFS) confirm these findings. The IFS shows that early weaning is seen as a method for infants to reach a set 'target weight' at 4 months, and a way to appease a baby if the mother feels it is often crying because of hunger, or because milk seemed no longer sufficient for the baby (Bolling et al., 2007). A real challenge for policy emerges when mothers are offered conflicting advice from formal compared to informal sources, and successful information based policy initiatives should aim to educate mothers and also extend to the mother's informal network of support, such as her family and friends (Clarke and Gross, 2004).

Cooking Skills

As will be discussed in the subsequent chapter, many public health recommendations aim to educate parents on the importance of healthy eating by promoting the consumption of certain foods rather than others. The 5-a-day campaign is a good example of this. But many parents who may be aware of these recommendations, lack the basic knowledge, confidence and cooking skills necessary in order to be able to make healthy meals out of healthy foods. There appears to be substantial evidence endorsing initiatives which aim to educate individuals about food preparation and cooking skills in order to promote healthier dietary choices (Larson et al., 2006; Liquori et al., 1998; Stitt, 1996), although a lot of studies have focused on cooking skills taught to children in the school context.

Recent research in England, funded by the Department of Health, looked into families' attitudes and behaviours relating to diet and activity and found that mothers often feel anxious when cooking food 'from scratch'. Many mothers feel uncomfortable in experimenting with new recipes which they fear will be rejected by children. The lack of confidence in cooking, but also often a lack of basic cooking skills, is a real and perceived barrier in introducing more home-made meals in the family menu, and many families rely on 'safe' options, usually ready-made, which they know children will eat (Department of Health, 2008b).

Thus, initiatives aiming to teach individuals basic food preparation and cooking skills could be useful for parents, as much as for children attending a 'home economics' class. This seems to be supported by recently published evidence from a small project carried out in urban communities in Scotland which evaluated the feasibility of an intervention programme aimed at improving the food skills of individuals living in areas of social deprivation, in improving the cooking confidence, food preparation skills and nutritional habits of individuals participating in the study (Wrieden et al., 2007). The evidence from this project indicated that this type of intervention programme is likely to have a positive, albeit small, effect on the food choices of individuals and on their confidence in preparing and cooking food. Thus, information-based policy initiatives could perhaps invest more resources in teaching individuals and families, not only what to eat, but also how to cook, prepare and store the foods which are recommended for a healthier diet.

Food and Family Eating Habits

Communal Eating

Research which has looked at the influence of meal habits has shown that family meal times are a predictor of young children's vegetable consumption, with shared meals being linked to more vegetables eaten (Cooke et al., 2003; Gable and Lutz, 2000). Also, the environment in which the meal is eaten is important as family meals eaten in front of the television are associated with a lower consumption of vegetables and fruit (Coon et al., 2001). However, family meals eating can also be related to detrimental effects on children's diets particularly when there are competing social and nutritional goals. Parental attempts to feed children undesirable food may result in a disruption of the family peace, making it at times more practical to just let children choose less healthy, but preferred, food (Brewis and Gartin, 2006).

The above studies provide interesting findings, but they based on small convenience samples, and only one is based on UK (London) data (Cooke et al., 2003), the rest being from the US. Finally, none of these studies were longitudinal, and none of them followed children from birth through infancy to the very early years, so they are unable to comment on the transitions and development of eating habits over time. Research drawing on longitudinal data from the Millennium Cohort Study (MCS) has the potential to contribute to these gaps in evidence. Recent findings from MCS data looking at child health and nutrition suggest that eating at regular mealtimes at age three was not associated with childhood obesity at age five among children, while cross-sectional analyses of the data showed that children who did not eat breakfast every day at age five were more likely to be overweight at age five (Griffiths et al., 2010a). No association emerged between children's consumption of drink and fruit and children's weight. Apart from the above book chapter, descriptive unadjusted analyses of MCS data on nutrition and BMI can be found in the official MCS user guide, but no conclusive results are reported regarding the consumption of different foods in relation to obesity and overweight (Hansen and Joshi, 2008).

While children's diets are heavily determined by the food choices of their parents, children are not passive recipients in the process of eating. A limited body of work has stressed the importance of considering children's behaviour and personality in the explanation of dietary patterns. Some evidence in this field suggests that children actively resist food they do not like and adamantly demand foods they prefer, thus limiting the control that parents can exert on children's diets (Brewis and Gartin, 2006). Food neo-phobia is an important determinant of fruit and vegetable consumption, and there may be 'innate' preferences for certain foods which vary between individuals (Cooke et al., 2003). Whether children are born as, or learn to become 'difficult eaters', and whether food 'neo-phobia' is a product of nature or nurture can be debated. However, when meal-times become tense, parental control over children's food choices has been found to make the meal-time experience unpleasant (Hoerr et al., 2005). Nevertheless, some good strategies for introducing healthy options at meal-times exist, with frequent exposure accompanied by praise being a good tactic (Wardle et al., 2003).

Children can reject foods they are offered within the home, but they can also influence what foods are brought into the home when they participate in weekly shopping decisions. The layout of super-markets is not particularly helpful. As acclaimed food journalist Joanna Blythman states "when supermarkets routinely and cynically put sweets and confectionary at the till, this was the typical flashpoint for the all too familiar parent/child battle: '*I want it – You can't have it*' (Blythman, 1999:199 emphasis in original). Parents often find it difficult to resist children's requests for foods, even if they recognise these may not be healthy (Lewis and Hill, 1998). Thus, while parents are in control of the food budget for the family, this should not overshadow the agency that children have over family food choices. Children have several ways of making choices, whether by actively asking for certain foods, or by practising selecting eating from the foods on offer. Also, children's perseverance at outright refusing certain foods may often win over the determination of parents to feed them those foods.

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Parental Diet and Sharing Food

Unsurprisingly, a vast body of research has linked children's diets to parents' diets. Parental consumption of fruit and vegetables has been found to be a key predictor of children's consumption (Cooke et al., 2003), while parental consumption of unhealthy foods predicts children's consumption of these food (Campbell et al., 2007). Thus, perhaps unsurprisingly, parental obesity has also been found to predict child obesity (Koeppen-Schomerus et al., 2001). Moreover, obesogenic eating habits appear to be "socially", rather genetically, inherited by children particularly from the parent of the same gender – mother to daughter/father to son – indicating the impact that parents have as role-models on eating habits (Pastor-Perez et al., 2009).

This is particularly concerning in the Scottish setting where the diet of the adult population of Scotland is notoriously unhealthy (Wrieden et al., 2006). Parents are less likely to expose children to foods which they themselves do not like, and given the family-contextual nature of children's relationship to food, addressing poor nutrition in childhood requires action at the family level (Reilly, 2006; Skinner et al., 2002). Therefore, any policy explicitly aiming to change young children’s relationship with food, must also target the home environment and dietary patterns, habits and beliefs acquired within the home.

Joint meals among family members have been shown to be linked to healthier eating habits among children. It is likely that eating together provides parents with multiple repeated opportunities to expose their children to different types of foods. A study, based on a convenience sample of 50 children in three London primary schools, looked at the effects on consumption of red peppers following food exposure to red peppers compared to reward in cartoon stickers for eating red peppers (Wardle et al., 2003). The authors reported that the exposure method was linked to increased liking and consumption, while the reward method was not. Also, parents may use more coercive methods when feeding children healthier foods, which in itself can decrease the children’s liking of these foods (Benton, 2004). Children may at times be forced to adhere to the ‘clean plate’ rule, overlooking the importance of appropriate portion sizes for children of different ages (Birch et al., 1984). This can in turn influence children’s ability to rely on satiety cues to decide when they are full. Other techniques such as agreeing on trade-offs where children are rewarded with more appealing foods or sweets in exchange for eating, for example, vegetables are also detrimental, as they can distort children’s perception of the relative desirability of these foods (Brewis and Gartin, 2006). On the other hand, excessive control over the consumption of certain unhealthy but desirable foods can be equally detrimental as it may enhance the desirability of these foods (Benton, 2004).

The relationship between meal habits and children’s diets appears to be extensively researched. But the reviewed studies are based primarily on children of school age. In turn, the early years period following weaning is relatively under-researched. Also, the reviewed literature is lacking evidence from nationally representative samples, and from sample based on UK populations. Finally, there is a real shortage of evidence drawing on longitudinal data which can offer and insight into how children’s dietary habits evolve from birth through the early childhood period. This thesis aims to address the above limitations.

Food and Childcare

The importance of food habits developed when children are in formal and informal care should not be over-looked. Children spend a significant amount of time being cared for by grandparents, child-minders and nurseries. Data from the first sweep of GUS show that 60% of parents of 10-month old babies in the baby cohort reported using some form of childcare, with the figure rising to 68% the following year, and to 76% in the third consecutive year of the survey (Bradshaw and Wasoff, 2009). Data on the toddler cohort of the same survey showed that when children were aged just under 5 years, 99% of parents reported using some form of childcare, and this is explained by the universal take-up of free pre-school places for children of this age group (Bradshaw et al., 2008). These figures confirm that most children do not grow up exclusively in the care of the nuclear family, and as such, their experiences with food are likely to be influenced by parents as well as grandparents, childminders, nurseries and peers within nurseries and pre-schools. An analysis which looks at how children's nutritional habits are influenced by their experiences of different forms of childcare is likely to be of considerable interest, but is beyond the scope of this thesis.

Nutritional Preferences from Infancy to Childhood

Breastfeeding and Later Food Preferences

An overarching aim of the doctoral research presented in this thesis is to add to the limited evidence base looking at how children's nutritional habits and preferences develop from birth through infancy and early childhood. Research has shown that the flavours of foods experienced by the baby in the womb influence the children's response to these flavours after birth and potentially during weaning (Mennella et al., 2001; Schaal et al., 2000), and while antenatal food experiences would be of general interest to this doctoral research project, this thesis will focus exclusively on post-partum nutrition, primarily because the data used for the analysis did not capture information on maternal diet during pregnancy.

While exposure to breast milk, even if only once, is known to be beneficial, research suggests, and health policy recommends, that mothers ideally breastfeed for a prolonged period, 6-8 weeks according to the Scottish Government, and 6 months according to the WHO (Scottish Government, 2008b; WHO, 2002). Thus, whilst this thesis aims to explore the patterns of breastfeeding *duration* among mothers in Scotland, it also aims to explore the relationship between breastfeeding and later nutritional habits as infants grow into toddlers. A review of related literature on breastfeeding duration follows. The importance of breastfeeding initiation and the socially and educationally differentiated patterns of breastfeeding take-up were discussed as part of the MSc thesis which preceded this doctoral research, part of which has been published (Skafida, 2009).

An extensive literature has shown that the nutritional habits adopted in the early years of life often persist into adulthood and that breastfeeding in infancy is linked to, among other things, a lower risk in developing obesity, diabetes, and a range of respiratory illnesses in later childhood (Fewtrell, 2004; Gilman et al., 2001; Koletzko, 2004). Research using Millennium Cohort Study data found that children were more likely to be overweight if they had never been breastfed, while the risk of being overnight fell with longer durations of breastfeeding (Griffiths et al., 2009; Griffiths et al., 2010a; Griffiths et al., 2010b) pointing to the importance of intervening in the early years period. Aside from children's positive health outcomes from prolonged breastfeeding, breast-milk also allows the infant to be exposed to a variety of flavours transmitted to the milk through the mother's diet. This could arguably lead to breast-fed babies becoming more accustomed to eating a varied diet from a younger age than those fed on formula milk, which has a constant non-changing flavour (Mennella and Beauchamp, 1991). Indeed, some research has shown that breastfed infants were more willing to eat a new vegetable than formula-fed infants (Sullivan and Birch, 1994) and that flavours experienced while breastfeeding can influence food preferences in later childhood (Mennella and Beauchamp, 1991). However, previous studies were primarily controlled trials based on small non-representative samples, mostly in the US, which have looked at the relationship between breastfeeding and children's response to specific foods at the point of weaning. On the other hand, research undertaken for this thesis is based on a nationally representative Scottish sample and on longitudinal data collected at annual intervals throughout children's infancy and early years. As such, it allows for a more comprehensive understanding of children's nutritional trajectories over time, starting with breastfeeding, followed by weaning and then eating as experienced within the context of family life in Scotland.

Weaning and Subsequent Food Preferences

While breastfeeding has received growing interest in research as well as policy, the same cannot be said for the process of introducing infants onto solid foods after breast- or formula-milk, and this process, typically referred to as weaning, is fairly under-researched. This is despite the fact that the timing of weaning and the foods given to children when weaning have been found to have a statistically significant health impact on later childhood health (Chandra, 2000; Department of Health, 1994, Griffiths et al., 2010a). Research based on data from the Dundee Infant Feeding study found that children weaned prior to the 4 month threshold were more likely to manifest respiratory problems, be of heavier weight, and have more body fat by the age of seven compared to children weaned later (Forsyth, 2001; Wilson et al., 1998). Perhaps these children adopted less healthy eating habits during their childhood years, although this was not specifically explored in the research published from this data.

The Dundee Infant Feeding study collected valuable medical anthropometric measurements, but only a limited number of contextual variables, and no data collection took place when children were aged between 2 and 7 years old to monitor transitions in eating habits or changes in family life. Thus, while GUS lacks the breadth of medical data collected in the Dundee study, it *does* allow an analysis of weaning and child nutrition to account for the familial and social context in which weaning takes place. Also, the annual data collection schedule of GUS means that reliable prospective data can be collected throughout the crucial early years period.

Foods Used in Weaning

The types of foods used to wean children onto a solid diet are important determinants of subsequent food preferences. A study on a sample of 48 mothers in Philadelphia, US, showed that children who were weaned to a diet consisting of a variety of vegetables were more likely to accept novel foods than those who were weaned on a less varied diet (Gerrish and Mennella, 2001). Exposure to flavours is important, while evidence seems to suggest that exposure to different textures is also important. Infants who are exposed to ‘lumpy’ non pureed foods in the early stages of weaning are more likely to eat foods that the rest of the family consumed and be more ‘open-minded’ eaters than those for whom lumpy foods were introduced at a later stage (Coulthard et al., 2008; Northstone et al., 2001).

The Food Standards Agency’s (FSA) recommendations for weaning do indicate what foods should ideally be avoided when weaning children. The FSA warns against foods which may pose an immediate threat to babies’ health, such as honey, peanuts, certain types of fish, and also wheat, eggs and unpasteurised cheeses if weaning before 6 months. The FSA also recommends limiting the amount of salt and sugar that the baby eats, as overconsumption of these may influence the children’s future preferences for these foods and have a long-term effect on their health in later childhood and adult life (Food Standards Agency, 2009). Data from the latest Infant Feeding Survey (IFS) in 2005 show that most mothers (71%) fed their babies crisps less than once a week (Bolling et al., 2007). This means that 3 in 10 children are still eating highly salt-laden crisps at least once a week while being weaned. Also, 30% of mothers state that their baby eats sweets, chocolates or biscuits 1 to 6 times a week, and 9% eat these foods at least once a day. Informing parents about the importance of delaying weaning is likely to be beneficial for children’s diets, but more could perhaps be done to improve the food choices which parents make when they wean children onto a diet of solid foods. Using data available in the GUS survey, this thesis will only focus on the timing of weaning, rather than the foods used to wean children onto a solid diet, in relation to subsequent food preferences in toddlerhood.

Nutrition and Child Development

There are several other aspects of children's development related to nutritional habits which would merit further attention, but which are beyond the scope of this doctoral research. A brief overview of these is provided below.

Diet and Exercise

The relationship between diet in early childhood and children's physical activity is an interesting topic for research and data from the third official report for GUS indicated that children who were more active were also more likely to consume a larger variety of vegetables and fruit than their less active peers (Marryat et al., 2009). While a correlation between activity and nutrition is evident, more research, particularly of a longitudinal nature, could help to explain to what extent activity influences nutritional habits, or to what extent both nutrition and activity are influenced by broader family characteristics regarding education and socio-economic background.

Diet and Obesity

While there are a multitude of negative health outcomes known to be associated to sub-optimal nutrition, one issue, that of child obesity, is at the forefront of public discourse, the media, and the health policy agenda. This at times overshadows the remaining serious health outcomes associated with poor nutritional habits, such as increased risk of diabetes, increased risk of certain cancers, problems related with high cholesterol, osteoporosis and problems with dental health. While child obesity has been under the spotlight over recent years, there are fewer studies looking at the relationship between nutrition and weight in the very early years (Baird et al., 2005; Griffiths et al., 2010a; Ong, 2000).

Diet and Dental Health

While obesity is the most visible and well-known outcome of poor diets, the negative health consequences of inadequate nutrition are multiple and do not limit themselves to obesity. A number of studies have established a link between the consumption of high sugar-sweetened foods, soft drinks and fruit juices, with an increased risk of dental decay, particularly among disadvantaged populations (Gregory et al., 1995;

James et al., 1997), stressing not only the importance of the amount of sugar consumed, but of the frequency with which it is consumed (Moynihan and Petersen, 2004). The WHO Oral Health Country/Area Profile Programme (CAPP) identifies dental health as an important indicator of child health. At a UK level, the British Association for the Study of Community Dentistry stated that Scotland's children have the poorest dental health and the least access to a dentist in the UK, explaining why this is an area of urgent policy concern. Their most recent data for 5-year old children in the UK indicates that Scotland and Wales both have a higher prevalence of caries than 5-year-olds in England, with children in the Greater Glasgow area having the worst rates in Scotland (BASCD, 2007).

Diet and Cognitive Development

Aside from the more visible and physiological consequences of detrimental food consumption, nutrition has also been found to influence children's cognitive development. While cognitive development may not be considered a health outcome as such, it is an important area for intervention in both broader child and health policy and educational policy. Most research in this field has focused particularly on the impact of breastfeeding on the cognitive development of children (Caspi et al., 2007; Lucas et al., 1992).

Gaps and Limitations of Existing Research

Social Theory and Social Policy

An overarching shortfall emerging from the reviewed empirical research literature is that research investigating children's nutritional habits in the early years is heavily monopolised by the medical sciences. There is a relative shortage of research addressing children's nutritional habits from more sociological perspectives. The reviewed literature often fails to reflect on the connections of research findings to broader social theory of human health behaviours and to the sociology of health and illness. A further shortcoming is the lack of appropriate reflection on the importance of public health policy. This is a two-fold shortfall as some studies fail to reflect how existing public health policy influences nutrition, while others fail to reflect adequately on the implications of research for future policy developments. This thesis aims to in part address these shortcomings, adopting a sociological, rather than medical, approach to understanding children's and families' nutritional patterns while reflecting on the implications of findings for policy aiming to improve the diets and health of children and families in Scotland.

UK Nutrition Research

Another general drawback with existing evidence is the relative shortage of research on young children's eating habits drawing on Scottish, or even UK populations. Research using the Millennium Cohort Data (MCS) is likely to contribute to meeting this research gap in the future, although the nutrition data from the survey have yet to be fully exploited in peer reviewed journals. Existing papers using MCS data have focused primarily on breastfeeding (Griffiths et al., 2009; Hawkins et al., 2007; Kelly and Watt, 2005), while food consumption data have been primarily reported in the non-peer reviewed user guide (Hansen and Joshi, 2008), and only briefly in a book chapter (Griffiths et al., 2010a). As such, the existing evidence can make a limited contribution to our knowledge of contemporary dietary habits among young children and families living in Scotland. This thesis aims to contribute into broadening the evidence base on children's nutritional patterns in the context of modern-day Scottish society and public health policy.

Nationally Representative Complex Data

Despite being somewhat behind the US in terms of nutrition research, evidence on infant and child nutrition in the UK is gradually accumulating. Nevertheless, most studies are based on small convenience samples used for qualitative analysis. While these often provide rich information regarding the complexities involved in making feeding decisions, they cannot be used to make inferences to a nationally representative account of how children's eating habits develop among families living in Scotland. Small-scale qualitative studies are also unable to properly control for important influential variables affecting child nutrition, such as income and education, occupational classification or family composition. As such, these studies are limited in the extent they to which they can produce a comprehensive picture of the relative importance of significant variables in predicting children's dietary habits.

Data on infant nutrition are also accumulating from large administrative surveys, particularly the Infant Feedings Survey (IFS) for the UK. These surveys, however, were originally intended as tools to be used for monitoring purposes. Administrative data sources, while they can provide nationally representative information, tend to lack the sufficient depth of data necessary to allow for an analysis of child nutrition to account for the social and familial context in which children's diets develop. The current data collected through GUS is meant to address these gaps in data, and as such inform future development of infant feeding and health policy in Scotland.

Early Years Blind Spot

A growing body of research is highlighting the importance of infant diet and very young children's nutrition in determining health outcomes in later childhood and adult life. Children learn dietary habits in infancy and early childhood and develop preferences which may influence the dietary habits they are likely to adopt as they grow into adults. Yet, data on children's dietary habits during infancy and the very early years are hard to find, and parents of very young children are hard to research given that they are naturally preoccupied with the demands of childrearing. Several studies on child nutrition have looked at children of school-age, and a growing body of evidence exists on nutrition in infancy. Many of the studies researching the dietary habits of infants were able to recruit their samples through maternity units and hospitals, while any studies on older children's diets have recruited though schools and pre-schools. But there is a severe shortage of research on children's lives and their diets in the period after breastfeeding and before they start school. As such, there is limited research which can explain how children's nutritional habits develop in toddlerhood and the early years period in the context of family life. This is where the data collected in GUS provide a unique opportunity to explore the nutritional habits of toddlers living in Scotland in the first five years of their life.

Longitudinal Data

The review of existing empirical literature revealed a general shortfall in data of a longitudinal nature. Reliable and representative longitudinal data could support research into how breast- or bottle-feeding is related to weaning and later eating patterns among children. The Infant Feeding Survey only recently started surveying weaning habits of children, while being previously only used to monitor breastfeeding, but it does not follow children's development into later childhood. The review indicated a clear gap in research based on longitudinal data which could explain the causal path behind children's nutritional trajectories. Some studies looked at the link between breastfeeding and food preferences at weaning, while others looked at the link between weaning and eating. However, the transitions from breastfeeding, to weaning and then to eating with the family, are under-researched and little is known about how nutritional habits are learned in the very early years of life.

With its longitudinal research design, this thesis will be able to explore the links between breastfeeding, weaning and eating habits in childhood on the current Scottish population of children. This might allow for a better understanding of the context in which weaning occurs, and the relationship of children's weaning experiences to their prior experiences of breast/bottle feeding, and subsequent eating habits. The longitudinal design is also expected to allow for a better understanding of the causal relationships between eating habits at different stages of children's lives, and allow for important contextual factors to be controlled for in multivariate analyses.

Family Context

Few of the reviewed studies thoroughly explored the communal nature of eating as it occurs within the context of family life. Most studies on breastfeeding, weaning and child feeding often adopts an 'atomistic' perspective of eating. There is a tendency to overemphasise the importance of *individual* food consumption and meal patterns, and to underemphasise the *communal* and *social* nature of how humans relate to food. Ultimately, when looking at very young children's nutritional habits, their individual choice is unquestionably constrained by the food choices of the parents. Children are socialised into different patterns of eating within the home setting, from infancy and early childhood and it is crucial to understand the context in which children come to develop their nutritional habits, making the family a sensible place to start.

The studies that have documented the relationship between parental eating habits and children's dietary quality, have focused primarily on older children. In fact, a vast body of literature based on samples of children who are past their toddler years focuses extensively on the challenges involved in getting children to eat healthy foods. Yet, more evidence is needed on how dietary habits of the under five are shaped by broader family meal habits. Compared to slightly older children, toddlers in their first years of life are less likely to confront parents when it comes to infant feeding, so this is likely to be a particularly crucial time for socialising children into adopting some nutritional habits rather than others. This research aims to make a significant contribution to the evidence in this area.

Diet and Fathers

Research on children's nutrition and parental feeding decisions is predominantly concerned with the mother. In part this is simply because mothers are typically the parents who take the lead in feeding children. This is particularly the case for infant feeding decisions and breastfeeding. Research on breastfeeding rarely looks at how the mother's partner, family or friends may also influence breastfeeding outcomes, and fails to recognise that breastfeeding decisions are rarely made in an 'individual vacuum', and often discussed with significant others. While it would be interesting to address this research gap in the current thesis, the data necessary to do so were not collected or included in the study design of the Growing Up in Scotland survey.

Perhaps the omission of such relevant variables is in and of itself a reflection of how the social and family context which frames parental infant feeding decisions is, in terms of research, still of secondary importance. Discourse on the influence of parents on children's diets is usually based on data reflecting the influence of mothers on children's diets. Ultimately, evidence on the importance of paternal health behaviours, eating habits and beliefs about child nutrition is still largely anecdotal.

Next Chapter

In order to appreciate the broader framework of health recommendations, public discourse, and health services which influence children's nutrition either directly or indirectly through parents, a comprehensive understanding of the Scottish social and health policy framework is necessary. In turn, Scottish social policy is also influenced by broader international recommendations advocated by institutions such as the WHO and the European Commission. Thus, a brief review of international policy developments concerned with breastfeeding, weaning and child nutrition may also be useful. The following chapter provides an overview of Scottish and international policy initiatives concerned with the nutrition of children of pre-school age, including policy on breastfeeding and weaning in infancy, and policy on young children‘s diets.

CHAPTER 2
Review of Related Policy Developments

Introduction

This chapter provides an overview of policy developments which concern children's nutrition in the early years. Some of the analysis in this thesis has been tailored so as to reflect directly on current recommendations and targets for child nutrition. This is particularly true for the analysis of breastfeeding duration, and the analysis of weaning. Also, discussions of results in chapters 5 to 8, reflect on the potential policy implications of the doctoral research findings for current and future policy. Thus, a brief overview of related policy developments is offered.

The first section provides an overview of key international policy developments on infant and young children's nutrition, while the second section explains the nature of and purpose of the Scottish Government and looks at analogous Scottish policy developments primarily in post-devolution Scotland. A comprehensive overview of policy on breastfeeding initiation is not within the scope of this thesis, but as the doctoral research includes analysis on patterns of breastfeeding duration, a brief overview of related policy is provided. This chapter concludes with some critical reflections regarding the limitations of the current policy landscape.

International Policy on Infant and Child Nutrition

The first section looks at policy developments which dealt specifically with the nutrition of infants, such as breastfeeding and weaning. The second section looks at policies focusing on the nutrition of toddler and young children.

Infant Nutrition

International policy on infant nutrition has evolved considerably over the last two decades, and extensive attention has been given particularly to the promotion of breastfeeding. In 1990, *The Innocenti Declaration* by WHO/UNICEF stated the need to approach global optimal maternal and child health. It stressed that infants should be fed *exclusively* on breast-milk from birth to 6 months and be weaned on complementary foods alongside breast-milk ‘until the age of two and beyond’ (WHO, 2006). This was followed by the *WHO/UNICEF Baby Friendly Initiative in 1991* which sought to improve the practice of health services awarding cooperating healthcare facilities with the *WHO/UNICEF Baby Friendly* status. Renewed emphasis has been placed on the *Innocenti Declaration* recommendations by the more recent publication in 2003, *WHO Global Strategy for Infant and Young Child Feeding*. The strategy calls for governments to introduce legislation protecting working women’s right to breastfeed, and to ensure that the health sector will ‘promote and support exclusive breastfeeding for six months and continued breastfeeding for up to two years and beyond’ (WHO, 2006).

The European Union’s working group for the promotion of breastfeeding in Europe published the *Protection, Promotion and Support of Breastfeeding in Europe* (European Commission, 2004). This conference document sets out a model for regional and national planning for the promotion of breastfeeding in EU member states. It states that ‘breastfeeding is the natural way to feed infants and young children’, and suggests that ‘exclusive breastfeeding for the first six months of life and continued breastfeeding up to two years and beyond ensures optimal growth' reaffirming the ambitious recommendations of the WHO (European Commission, 2004).

According to the WHO, 'exclusive breastfeeding from birth is possible for most women who choose to do so' (WHO 2006:2). However, this ignores the large number of mothers for whom exclusive breastfeeding is, albeit biologically 'possible', outright unfeasible or undesirable for different socio-cultural, economic or other personal reasons. The WHO is confident that breastfeeding is 'a natural act' (WHO 2003:8) and 'positive effects of breastfeeding on health of mothers and infants are observed in all settings'. However, research has shown that breastfeeding is not always straightforward and feeding difficulties can have adverse effects on the mother's psychological well-being, even leading to depression at times (Shakespeare and Garcia, 2004).

Yet, WHO guidelines for mothers who are unable to, or choose not to, breastfeed address mothers with extremely low-birth-weight babies needing additional nutrition, working mothers and HIV-positive mothers (WHO, 2006), while not addressing mothers who simply choose *not* to breastfeed for reasons other than exceptional debilitating circumstances. Since the *Innocenti Declaration* the recommendation of *exclusive* breastfeeding up to six months remains unaltered. In light of current breastfeeding rates in the UK and in light of research which reveals the difficulties in initiating and continuing breastfeeding, it would appear that WHO and EU commission targets are highly, if not unrealistically, ambitious for the UK context.

Child Nutrition

International institutions are increasingly acknowledging the importance for governments to promote healthy diets in the general public, and the importance to improve the diets of children. This occurs in a context of an epidemic of nutrition-related illnesses, such as obesity and diabetes, in more developed as well as some rapidly developing countries. While a comprehensive review of all policy developments related to child nutrition policy is not within the scope of the thesis, an overview of some important publications follows below.

In 1998 the WHO produced a report which compared nutrition policies in the WHO European Member States (WHO, 1998). The report examined existing nutrition related policies and proposed a strategy to guide countries in developing and improving their policy initiatives aimed at promoting nutritional wellbeing. The analysis revealed that one third of countries did not make any reference to breastfeeding in their policy documents, and in some cases, breastfeeding recommendations were not co-ordinated with broader nutritional and health guidelines. The report recommended increasing the number of “Baby-Friendly” hospitals which would encourage mothers to breastfeed exclusively at birth and after discharge from hospital.

While breastfeeding was not on the policy agenda of all countries reviewed, recommendations and policy focusing on weaning were even less common. There were only two instances where weaning recommendations were in place, in Albania and Italy. The authors acknowledge that, as the report was structured on categories of interest provided in the World Declaration of the International Conference on Nutrition (1992), which focused on breastfeeding but not on complementary feeding, the importance of weaning may have been overlooked as a result.

The report stressed the importance of addressing weaning in policy initiatives, as it is during this period when poor weaning practices, such as early introduction of solid foods and cow’s milk before the age of 6 months can lead to infant mortality and morbidity. Also, in most countries, policy initiatives targeted vulnerable groups, often women and children, and many stressed the importance of school feeding programmes in ensuring adequate nutrition for school children. Ultimately, it seems that focusing public health policy on a) encouraging mothers to breastfeed at birth, and b) improving children’s nutrition in the school setting, provide policy makers with target groups which are easier to address in relative terms compared to addressing the weaning habits of toddlers who are being introduced to solids at different time points outside the institutional setting of the hospital or the school.

In 2000, the Commission of the Nutrition Challenges of the 21st Century produced its final report entitled *Ending malnutrition by 2020: an agenda for change in the millennium* (Commission on the Nutrition Challenges of the 21st Century, 2000). The report was global in scope, and therefore focused primarily on malnutrition and famine in the developing world. Nevertheless, it re-iterated that living without malnutrition is a fundamental human right and defending this right is a societal responsibility. Most importantly, the report focused on the burden of mother-child cycles of malnutrition, which result in children born with a pre-disposition for adult diet-related diseases.

While hunger is uncommon, albeit not absent, in the Scottish population, the problem of malnutrition, understood as *inadequate* or *insufficient* consumption of necessary nutrients, is at the heart of the diet-related problems which plague children and adults in Scotland (Scottish Office, 1993). Thus even in the Scottish setting, many diet-related illnesses are socially and biologically inherited by children from their families. Figure 1 reproduced from the report illustrates the intergenerational nature of poor nutrition and diet-related illness in adult life, and provides a map of the complex causal pathways explaining how nutrition-related illnesses are socially and biologically transmitted between generations.

A Europe-focused report regarding nutrition policy was published by the WHO in 2000. The WHO Regional Committee for Europe endorsed the *First Action Plan for Food and Nutrition Policy for the WHO European Region for 2000-2005* (WHO, 2000), which provided a framework within which Member States were to develop policies regarding food and nutrition which would promote good health and halt the rise in food-related illnesses. Among other things, it stressed that low breastfeeding rates and poor weaning practices have detrimental effects on health in childhood and later life. The policy framework proposed a nutrition strategy which would promote optimal health particularly among low-income groups and during critical periods in life, such as pregnancy, lactation, infancy and childhood, re-iterating existing recommendations on breastfeeding and weaning. The report announced that the Regional Office would among other things, provide dietary guidelines on the feeding and nutrition of infants, young children and adults in 2000-2001.

Figure 1 Nutrition throughout the lifecycle

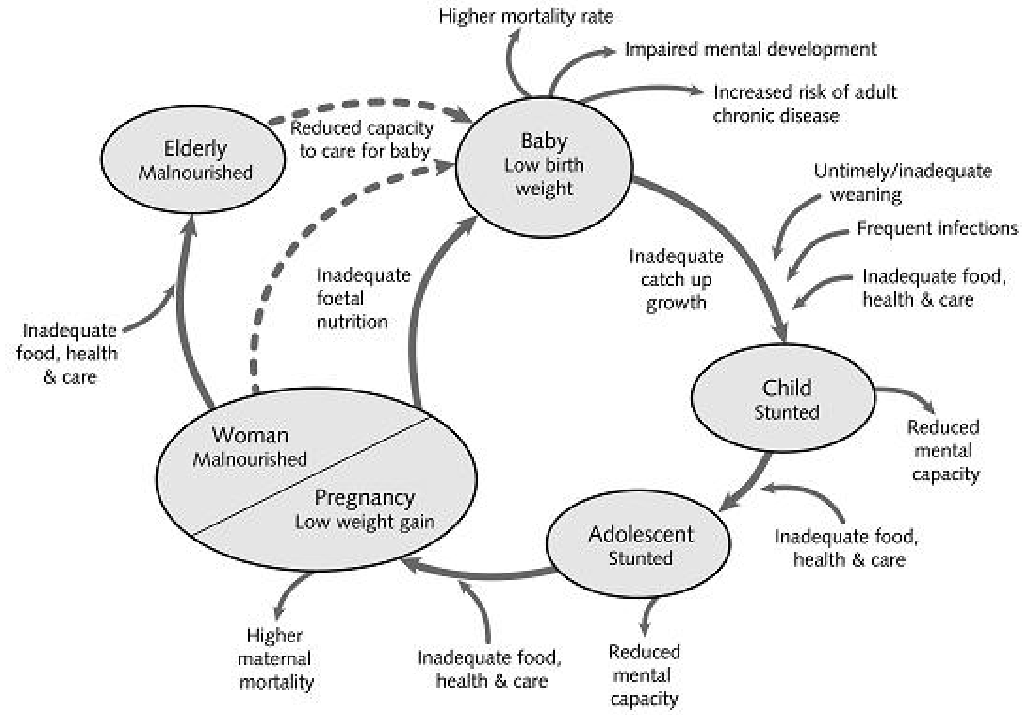


Figure reproduced from 'Ending malnutrition by 2020'(2000)Commission on the Nutrition Challenges of the 21st Century, pg.8

Several national studies were conducted in participating Member States following the *First Action Plan* in 2000. The *Comparative Analysis of Food and Nutrition Policies in WHO European Member States* compared food and nutrition policies among Member States based on the data collected since the above mentioned *First Action Plan* in 2000 (WHO, 2003a). According to the report, countries which had established national food and nutrition coordination bodies were more efficient in developing and implementing nutrition-related policies. The report states that across the member states reviewed, breastfeeding duration rates were higher among mothers of higher education. Denmark and Finland had the lowest rates (between 50-60% at 6 months), and Norway had the highest (80%) at 6 months.

The regional overview showed that in Western Europe (which included the UK) there were low breastfeeding rates and a tendency towards premature induction of complementary foods, especially among groups with lower education and social class. There also appeared to be a shortage of health professionals to support mothers with infant feeding and health issues. With respect to policy, the report found that many countries in Western Europe lacked the advisory and administrative structures necessary to ensure a successful and sustainable implementation of national food and nutrition policies. Also, while many member states had developed dietary guidelines, not all population groups were addressed by these guidelines equally well.

In 2004, the WHO launched the *Global Strategy on Diet, Physical Activity and Health*, aimed to promote and protect health and reduce diet and physical activity related mortality and morbidity. The strategy focuses on the importance of nutrition and activity of children and adolescents, maternal health and nutrition before and during pregnancy and early infant nutrition in preventing life-style related illness in later life. Among the numerous recommendations, it is proposed that food and cash distribution programmes providing or subsidising food for certain groups in society should focus on the quality of nutrition, and not only on quantity. Further recommendations consider the proper nutritional education and food provision in the school setting. Thus, while the strategy addressed children of school age, and re-iterated advice on exclusive breastfeeding, little attention was given to toddlers' diets within the home and family context in the period after infancy and before school age.

In 2007, a report from the WHO conference on counteracting obesity in Europe, focused on the challenges posed by the 'obesity epidemic' in the European region. The increasingly faster rate of growth of obesity among children was stated to be of particular concern. The report refers to evidence which has associated breastfeeding, especially longer durations of breastfeeding, along with appropriate weaning to a smaller risk of overweight and obesity in childhood. The report states that methods for promoting breastfeeding may differ between mothers who wish to breastfeed and those who wish to bottle-feed. Apart from targeting mothers, initiatives should also seek to improve maternity ward practices which promote mother-infant contact, such as abolishing set feeding times and the routine separation of mother and baby, and should also address the attitudes and expectations of health professionals (WHO, 2007).

The report distinguished itself for the extensive attention paid to nutritional patterns within the family context during the early years of life. It emphasised how parental food preferences, parental BMI, and parental education and socioeconomic status influence children's nutritional patterns. It also acknowledges the impact that different family meal habits and parental strategies to promote or prohibit certain foods had on children's diets. The importance of family incomes and food prices on diet was also stressed, and with price being a key influence on food choices, raising taxes on unhealthy foods was proposed as a strategy to reduce obesity in several countries (WHO, 2007).

The conference report stressed that disadvantaged societal groups were more at risk of nutrition poverty, yet these groups were not always appropriately catered for. However, policy targeted towards at-risk groups was not necessarily proposed as a good solution, and initiatives would also need to target providers of health information, the food distribution sector, policy makers, public opinion leaders and even celebrities – Jamie Oliver's campaign was cited as an example. Figure 2 reproduced from an earlier WHO publication about nutrition and health in Europe (Robertson et al., 2004:12) illustrates what a multi-faceted nutrition policy strategy would encompass. This shows that a comprehensive strategy needs to also involve initiatives in employment policy, advertising and mass media, and education, in order to influence not only parental food choices, but also food availability and food access.

The scope of the 2007 WHO conference report was clearly to address the internationally growing problem of obesity. However, focusing on the physically visible effects of unhealthy eating runs the risk of overstating the importance of weight, and understating the importance of healthy nutrition per se. Needless to say, there are many children in Scotland who may not be overweight or obese but who nonetheless suffer from nutrient deficiencies, poor dental health, and poor fitness.

Figure 2 The Influences on Food Choices

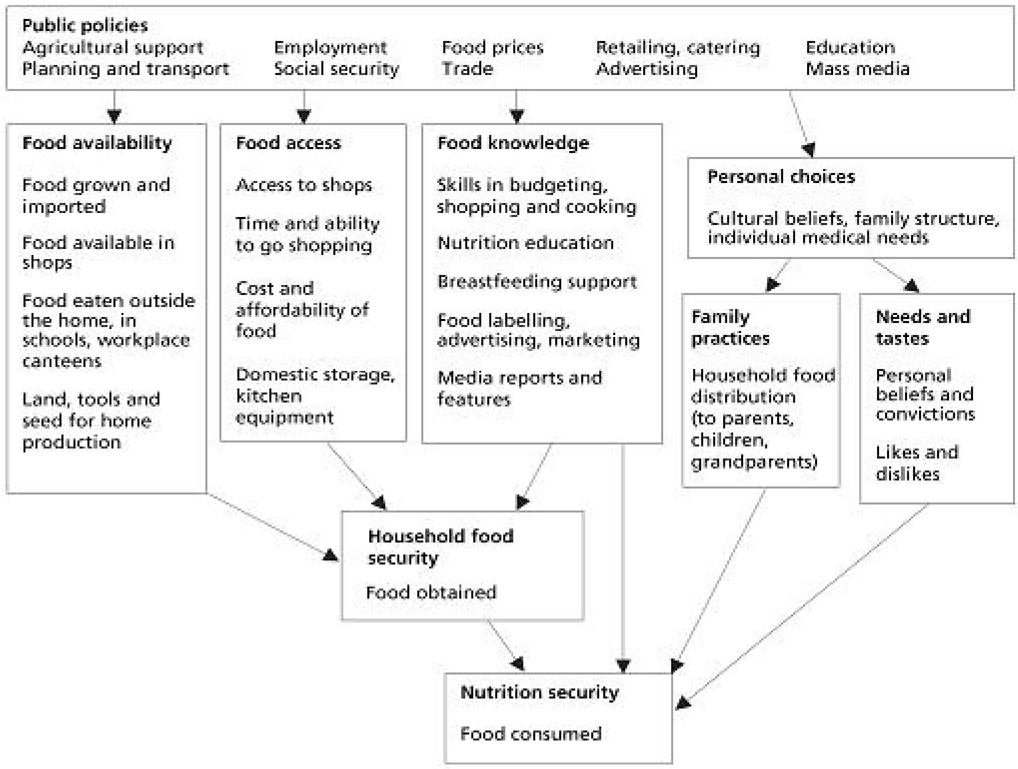


Figure reproduced from 'Food and Health in Europe: A new basis for action' (2004) WHO Regional Publications, European Series No.96, pg.12

In 2008, the WHO produced the *European Action Plan for Food and Nutrition Policy 2007-2012* (WHO, 2008) which followed the *First Action Plan* reviewed earlier, and called for Member States to develop and implement nutrition policies. Children in their early years featured as a key target group, and the importance of promoting optimal foetal and infant nutrition and infant weaning as well as promoting school and pre-school institution-based educational programmes for children was stressed. The *Action Plan* suggested that government guidelines should be food-based and accessible to vulnerable groups. Policies should also address food supply and ensure appropriate marking practices and adequate labelling of foods.

While the *Action Plan* stressed the importance of integrated, comprehensive strategies, there was still a relative shortage of measures proposed for addressing the nutritional habits of children between the ages of 1-5 where recommendations on breastfeeding and weaning no longer apply, and when many children do not yet attend nurseries or schools on a full-time basis. Despite the positive developments, there is still a relative gap in international policy on children of this age group, and WHO recommendations do not adequately address the importance of learning healthy nutritional habits in infancy and the toddler years through shared meal experiences in a family context.

Scottish Health and Nutrition Policy

Throughout the UK, local and devolved governments have become increasingly involved and autonomous in developing and implementing food policy, and this is particularly the case for Scotland (Lang et al., 2009). The nature and origins of the Scottish Governance framework have been explained in the introduction of the thesis (page 2). The Scottish Government is the authority currently responsible for, among other things, developing and implementing public health policy in Scotland, including policy addressing child nutrition and health. Thus, Scottish policy development is independent to parallel developments which may be underway in England and Wales, or in Northern Ireland, and it is Scottish public health policy which primarily shapes the policy environment which affects the every-day lives of the Scottish population. Given the devolved nature of Scottish governance, a review of Scottish health and nutrition policy follows.

Social policy initiatives at a national and supra-national level have been increasingly concerned with the health and nutrition of children over the last decade. A comprehensive analysis of children's and families' current nutritional patterns requires an understanding of the developments in the related policy fields. A series of specifically nutrition related policy publications and initiatives has been launched since devolution. These have been framed within the Scottish Government's broader pursuit in promoting social justice. The importance of healthy lifestyle choices was outlined in *Social Justice: A Scotland where everyone matters* (Scottish Executive, 1999), and in the *Building a Better Scotland* government plan (Scottish Executive, 2004a). This section provides a critical overview of current Scottish policy initiatives and recommendations regarding the health and nutrition of children.

Infant Nutrition

Breastfeeding

Prior to devolution, breastfeeding promotion first appeared on the Scottish policy agenda with the launch of the Scottish Joint Breastfeeding Initiative in 1990. In the 1994 Scottish Dietary Targets it was hoped that breastfeeding take-up in the 6 weeks following birth would rise from 30% to 50% by 2005. In 1995, an appointed National Breastfeeding Advisor was to work with Local Breastfeeding Initiatives in raising awareness regarding breastfeeding benefits.

Measures to improve children’s health have been gradually incorporated in broader child-centred policy initiatives. In 1998 the Scottish Office introduced the Sure Start Scotland Initiative, based on Sure Start introduced in England and Wales (Scottish Office, 1998). While the Sure Start strategy is primarily concerned with providing families with access to affordable and appropriate childcare, one of the four central objectives of the strategy is to improve children’s health. A subsequent evaluation of Sure Start Scotland reported that the strategy did not explicitly address breastfeeding and only some local authorities created initiatives to promote breastfeeding, but these were not universally implemented (Cunningham-Burley et al., 2005:17). The *Integrated Strategy for Early Years* was launched in 2003 and aimed to improve children’s health, and increase the proportion of women who breastfed (Scottish Executive, 2003a). Indeed, Scotland later became the first nation in the world to make breastfeeding a legal right in 2005 with the *Breastfeeding etc. (Scotland) Act 2005*.

Recent Government policy has paid extensive attention to the importance of good nutrition in infancy and continues to stress the importance of promoting breastfeeding. The *Better Health, Better Care Action Plan* outlines how NHS boards will be expected to support breastfeeding so that one third of all infants are being exclusively breastfed at 6-8 weeks by 2010/11 (Scottish Government, 2007). To support this goal, a national *Infant Nutrition Co-ordinator* was appointed in May 2008. The main role of the co-ordinator is to lead the development and the implementation of a *Maternal and Infant Nutrition Strategy*, which aims to improve nutrition of pregnant mothers and the nutrition of children in infancy and early childhood (Scottish Government, 2008b).

Following the election of a new government in 2007, desirable National Outcomes were announced and these have defined the direction of Scottish policy developments from 2007 onwards. Subsequently, *HEAT* targets were also introduced to guide policy development and evaluation in relation to these National Outcomes. HEAT is an acronym for the priority areas of Health Improvement, Efficiency, Access, and Treatment. HEAT targets are short to medium term, and are reviewed on an annual basis and published each November. The updated targets for the Health Improvement priority area for 2010-2011 are to address Scotland's major public health challenges, including obesity, and to ensure children get the best start in life. A commitment to achieve these goals was made with the launch of the *Healthy eating Active Living Action Plan* which announced that £56 million would be spent to improve Scotland's diet, fitness and health (Scottish Government, 2008b). This *Action Plan* stated that the HEAT targets with regard to infant nutrition hoped to see an increase in the proportion of newborn children who are exclusively breastfed at 6-8 weeks from 26.2% in 2006-2007 to 32.7% in 2010-11.

Weaning

While extensive policy developments have taken place with regard to breastfeeding promotion in Scotland over the last decade, analogous attention has not been given to the weaning of infants from a milk-based diet onto a diet of solid foods. Educating mothers on the detrimental effects of premature weaning is broadly within the remit of the *Maternal and Infant Nutrition Strategy* (Campbell, 2010). However, unlike for breastfeeding, supporting the delayed weaning of infants onto a solid diet is not part of the government HEAT targets. Weaning generally does not feature prominently in recent policy action plans (Scottish Government, 2007; Scottish Government, 2008b).

Resources aimed to educate parents on infant nutrition do advise against premature weaning, such as the NHS Health Scotland *Off to a Good Start* booklet which encourages parents not to introduce solid food too early (NHS Health Scotland, 2009a). More specific advice regarding weaning can be found in the *Ready Steady Baby* booklet given free to all pregnant mothers in Scotland. This booklet suggests that mothers wean after babies have turned 6 months old and not before they have turned 4 months (NHS Health Scotland, 2009b). So it would appear that advice about optimal weaning is being promoted at ‘ground level’, even if weaning as a topic of policy interest is not as prominent as breastfeeding in official policy action plans.

Children’s Nutrition

Health and nutrition were a key priority on the Scottish policy agenda already before devolution. The first official policy landmark was the *Scottish Diet Report* published by the Scottish Office in 1993 (Scottish Office, 1993). It exposed the magnitude of the problem of Scottish dietary habits and found the average diet to be deficient in fibre, fruits and vegetables and too high in sugar salt and saturated fat. Following the report, a Scottish Diet Action Group was set up in 1995 to work on the development of a national Action Plan.

In 1996, the *Scottish Diet Action Plan* (SDAP) was launched, as announced in the *Eating for Health: a Diet Action Plan Scotland* (Scottish Office, 1996). This Plan addressed the different stages of food production and consumption and contained a range of recommendations for producers of food, the retail sector, local authorities, communities, and the NHS. Particular attention was paid to the importance of nutrition during pregnancy, and among pre-school children and children of school age. Most relevant recommendations regarded the promotion of and support for educating school children about food and healthy living. The *Action Plan* noted the importance of promoting breastfeeding among mothers and improving the acceptance of breastfeeding among the general public. It also stressed the importance of addressing the nutritional needs of children under five years of age, which would primarily be done by providing parents, as well as nurseries, with appropriate information and guidance with respect to the nutritional needs of children in their early years (parag.6.21).

The continued support for the SDAP was outlined in the White Paper, *Towards a Healthier Scotland* (Scottish Office, 1999b). It stated that child health was a priority area for current and future policy, and that work was underway to promote better parental health, especially for pregnant mothers, better nutrition among children, and greater emphasis on breastfeeding. Initiatives such as Family Centres, Sure Start and the Starting Well project could contribute to meet these goals, and would focus on children from birth to 5 (Scottish Office, 1999:paragraph 49-50).

The importance of improving child nutrition was also stressed in the *Sure Start Scotland* programmes, launched in 1998 (Scottish Office, 1998). Part of the objective of the programme is to improve children's health and, where improving child nutrition would be central to this aim. A subsequent review of the programme found that the particular objective to improve children's health was not identified and pursued by services as much as other objectives of the *Sure Start* programme. Nevertheless, some councils reported that nurseries and family centres funded by Sure Start promoted healthy nutrition, physical activity and better dental health among children and parents in isolated examples across Scotland (Cunningham-Burley et al., 2005).

The growing profile of healthy eating for public health policy was confirmed again in 1998, when the *Foods Standards Agency* (FSA) was launched at UK state level. It was to be responsible for protecting public health by promoting a safer food supply and ensuring that consumers would be well-informed as to what constitutes a safe and healthy diet. In 2000 after devolution, the Food Standards Agency for Scotland was launched, but the core elements and recommendations of the FSA in Scotland generally mirror those for England and Wales. Recently, however, following the general election in May 2010, the Health Secretary for the new UK government announced the possible abolition of the FSA, perhaps indicating a re-evaluation of state priorities in light of the current financial crisis.

Renewed support for the SDAP came after devolution by the Scottish Parliament in the publication of *Our National Health: A Plan for Action, a Plan for Change* (Scottish Executive, 2000). The Scottish Parliament stressed that improving the Scottish diet would be an essential element in tackling social exclusion and improving the quality of life of the Scottish population. In June of 2003, the document *Improving Health in Scotland: The Challenge* publication (Scottish Executive, 2003b) extended the commitment towards the Scottish dietary targets to 2010, and stressed the importance of measuring progress. While the document focused on the general health of the nation, it also stressed the importance of implementing child-centred initiatives, and announced that work was underway to develop a national *Integrated Strategy for the Early Years*. The strategy would aim to improve young children's health, by among other things, improving children's diet and encouraging higher levels of physical activity (Scottish Executive, 2003b).

The follow-up document, *Eating for Health: Meeting the Challenge* (Scottish Executive, 2004b), set out a strategy for co-ordinated implementation of the *Scottish Diet Action Plan*, also emphasising the importance of measuring and monitoring progress. Consequently, the Working Group on Monitoring Scottish Dietary Targets was set up in April 2003, which recommended ways to better utilise data from existing nutritional surveys and highlighted research gaps, where other surveys could be commissioned (Food Standards Agency and Scottish Executive, 2004).

In 2003 the *Hungry for Success* report set out a whole school approach to school meals in primary and secondary schools in Scotland. A central element of the strategy was to set out nutritional standards for school meals which would encourage healthy eating among children of school age (Final Report of the Expert Panel on School Meals, 2003). Some of the featured measures included the provision of free fruit for all pupils in primary 1 and 2 and new nutrient standards for school meals. This approach came almost simultaneously as the launch of *A Scottish Framework* *for Nursing in Schools* (Scottish Executive, 2003c). This latter document stressed the need to integrate policies and strategies for children's services by introducing a national *Integrated Community Schools* strategy, which would see every school in Scotland becoming a recognised *Health Promoting School* by 2007. These schools would have to seek to actively promote good physical and emotional health and resilience. At the time of writing, the accreditation of schools as being *Health Promoting Schools* is being carried out at Local Authority level in Scotland, and progress towards the accreditation of all Scottish schools is still underway (Scottish Government, 2008c).

The well-being of children was the primary focus of the *Health for all Children (Hall 4)* document (Scottish Executive, 2005) which aimed to provide a comprehensive overview of current and up-coming national and local initiatives targeting child health related issues. Action targeted at children under five was primarily concerned with promoting breastfeeding and optimal weaning. Less attention was paid to children in their early years, and most initiatives for this age group target pre-schools and nurseries, with less attention being paid to children's nutrition within the home and within the family context.

In 2006 the 10-year *Scottish Diet Action Plan Review* (SDAP) analysed the differences and similarities between policies in Scotland and 12 other countries in the developed world. The review assessed the suitability and effectiveness of the SDAP strategy in changing dietary habits compared to policies of other similarly developed nations. Scottish initiatives such as *Hungry for Success* were praised for their effectiveness, but there was concern over Scotland's limited collaboration and contribution to nutrition policy at an international level. The review concluded that Scotland's future food and nutrition policy should be based on inter-sector collaboration and routed in the broader public health agenda, while the need for nationally representative data on food and nutrition in Scotland was acknowledged. Also, the reviews stated that the limited powers of the Scottish Government imply that measures involving changes in the taxation of certain foods cannot be implemented at a Scottish level. Finally, the review stressed the importance of children learning food-related skills within school-premises, and highlighted the need to promote a new food culture in Scotland.

While the review acknowledged the importance of school-based initiatives, it did not focus specifically on how the SDAP addressed the nutritional habits of very young children as they develop within the home. It could be argued that aspirations to improve toddlers' nutrition fall within broader aims of the SDAP to improve Scottish food culture, understood as a learned and shared experience and appreciation for food which is transmitted inter-generationally. The SDAP does aspire to make Scottish food culture more centred around healthy food options, although it does not acknowledge that within Scotland there may be many, rather than one, food cultures.

Thus far, policy developments have consistently failed to focus on the importance of children's diets in the very early pre-school years. In 2006, the *Nutritional Guidance for Early Years: Food choices for children aged 1-5 years* document announced that the *Hungry for Success* initiative would be extended to pre-school and childcare centres (Scottish Executive, 2006b). The report outlined how child centres and pre-schools can aid children in developing good nutritional habits and social skills, by having children participate in organised snack times at regular intervals where a variety of healthy foods can be made available for children to try. The document acknowledged that no specific dietary recommendations exist for children aged 1 to 5, but that aiming for five *child-sized* portions of fruit and vegetables per day and eating some wholegrain foods daily would keep children on the right track. This document was a positive measure in addressing the nutritional needs of children not yet of school age. However, it was exclusively concerned with children in the care setting, failing to account for the nutritional needs of young children within the home and context of family life.

The recent policy attention on the nutrition of children, and specifically of school-aged children has been epitomised by the passing of the Schools (Health Promotion and Nutrition) (Scotland) Act 2007, which requires Scottish Ministers and local authorities to ensure that that food and drink provided in all local authority and grantaided schools comply to the government set nutritional requirements. The Act set out a whole-school approach to school meals in primary and secondary schools in Scotland and set out nutritional standards for school meals which would encourage healthy eating.

In 2007 the Government launched the *Better Health, Better Care Action Plan* which explained the measures which the Government would take to improve Scotland's health, address health inequalities and improve healthcare access. An additional sum of £11.5 million has been allocated which, over the next three years, would be used to help, particularly children, tackle obesity through diet and physical activity initiatives. The document announced the upcoming launch of a *Food and Health Delivery Plan* in 2008 which would complement the ongoing development of a national food and health policy (Scottish Government, 2007). These initiatives would include programmes of provision of free fruit and vegetables for pregnant women and pre-school children. As for school-aged children, the action plan foresaw the national roll out of free healthy school lunches for all Primary 1-3 pupils in 2009/10 provided the trial schemes in five Scottish Local Authority areas would result in positive feedback. Following a positive evaluation of the trial scheme (MacLardie et al., 2008) the national Scottish roll-out was announced by the Scottish Government in October 2008. There was also an intention to extend the free school meals entitlement to all primary and secondary pupils of families in receipt of both maximum child tax credits and maximum working tax credits from August 2009.

Plans laid out in *Better Health, Better Care* have been developed further in the *Healthy Eating Active Living Action Plan* in 2008. The Action Plan announced a total of £56 million, including £40 million of new funding, allocated for the following three-year period to promote good health and address health inequalities primarily through healthy living initiatives (Scottish Government, 2008b). Part of the £40 million budget was be allocated to promote sports, dance, walking and healthy cooking projects to children and young adults at school to encourage more healthy living among these particular age groups (Scottish Government, 2008b). Almost half of this new funding, £19 million, was made available for 2008-2011 in order to improve nutrition of women of childbearing age, pregnant women and children under five in disadvantaged areas. The *Action Plan* hoped to increase the uptake of eligible mothers participating in *Healthy Start* initiatives from the current rate of 87%. Apart from receiving vouchers, participants on the *Healthy Start* initiative would be given assistance with issues such as breastfeeding nutrition during and after pregnancy, cooking skills, and general healthy living advice.

More recent policy developments seem to indicate that the early years period is gradually being given more attention in the roll out of initiatives aimed at improving child nutrition. The *Nutritional Guidance for Early Years* document setting out a framework for the dietary needs of children aged 1-5 was one of the key improvements in this field. Yet, there seems to be a piecemeal approach in addressing the dietary habits of children aged 1-5 within the context of family life and family meal habits. In relative terms, policy attention on the nutrition of toddlers and children under five is dwarfed by the larger emphasis placed on the nutrition and breastfeeding of infants and the nutrition of children in the school-setting.

Critical Reflections on Child Nutrition Policy

Several positive developments have taken place in policy initiatives aiming to improve the diets and health of young children. Nevertheless, there is considerable room for improvement, and this section reflects on some of the shortcomings of the above reviewed Scottish and international policy developments.

Comparing Scottish, British and International Policy

Developments in Scottish nutrition and child health policy have largely mirrored the advice provided by the WHO. Consequently, many of the criticisms of current Scottish public health policy also apply to broader international policy developments. The only evident divergence in Scottish and international policy applies to current breastfeeding targets. The WHO and Scottish Government recommendations are in agreement with respect to the benefits of breast-milk and the importance of facilitating longer breastfeeding. Until recently, they used to differ both on the issue of exclusivity and the proposed duration of breastfeeding. The WHO has strongly recommended exclusive rather than complementary breastfeeding up to 6 months, while the Scottish Government did not originally aim to promote exclusive breastfeeding duration as such and was more concerned with increased complementary or exclusive breastfeeding at 6 weeks. Since 2007, the Scottish Government has aligned its recommendations to those of the WHO with respect to encouraging *exclusive* breastfeeding, but the official targets lie at a rather less ambitious, and arguably more realistic, target of increasing exclusive breastfeeding duration at 6-8 weeks, rather than 6 months as advised by the WHO.

Early Childhood Blind Spot

The review of Scottish and international policy on child nutrition and health indicated that the vast bulk of policy attention on children’s diets has focused on either infant nutrition and breastfeeding, or on the diets of children of school age. In general terms, there is a policy blind spot when it comes to the eating habits of young children under five years of age. There have been recent important developments in addressing the policy gap for children between early infancy and school age. Initially this has been done by targeting policy initiatives towards the institutions where very young children, when not cared for in the family, spend the majority of their day, such as pre-schools and day-care centres. The Scottish Government has taken progressively more direct and visible measures for this age-group, setting out specific guidelines with respect to the nutritional requirements of younger children in childcare (Scottish Executive, 2006b).

Despite the attention paid to children’s day care centres and schools, the nutritional habits learned from parents, grandparents and siblings within the family provide the main foundation of children’s diets and health in later childhood and adulthood. Thus, a national food policy which does *not* address children’s eating patterns within the home and the family is incomplete. There is still room for initiatives which target children in their early years as they grow up in the intimate context of family life. It is during this period that toddlers and young children learn eating habits and develop food preferences influenced by their daily food experiences within the home.

Initiatives which promote healthy eating habits among children of this age may successfully reduce the proportion of children who go on to start school with already engrained poor nutritional habits. Understandably, initiatives targeting children in primary schools and similar institutions are bound to be easier to implement, monitor and fund. But improving the eating habits of school-aged children who have spent their first five years of life eating unhealthy foods is likely to be more challenging than teaching toddlers to appreciate a healthy and varied diet in the first place. The prevention of problems is usually preferable to the solution of problems, and children's dietary habits are unlikely to be any different in this respect.

To illustrate with an example of policy developed to focus on the eating habits of families as a whole, it is worth referring briefly to the *Healthy Weight Healthy Lives* initiative in England and Wales (Department of Health, 2008a; Department of Health, 2008b) which launched *Change4Life.* This is social marketing strategy aimed at improving the nutrition and fitness of families, by encouraging positive health behaviours at a family level. Among other things, the *Change4Life* strategy focuses on promoting structured meal-times and limited snacking, and providing parents and children with the skills and knowledge for making better choices when shopping for food and preparing healthy meals. In contrast to initiatives which focus on either children or adults, this strategy is relatively innovative as it aims to change health-related behaviours of families rather than of individuals within families.

Nutrition in Childcare

As the review of policy indicated, initial policy developments addressing the diets of children aged under five have focused on children in formal care settings (Scottish Executive, 2006b). Nurseries came under increasing scrutiny in recent years with food provision in childcare being increasingly monitored by government authorities. The *Nutritional Guidelines for the Early Years – Children 1-5* document, aimed at providers of childcare, gives much needed guidance on menu planning and nutritional requirements for young children in childcare. However, it relies on voluntary compliance and is not a legally binding or compulsory strategy for childcare providers, which may result in fragmented implementation across Scotland

(Scottish Executive, 2006b). This differs to the situation in England and Wales, where Ofsted regulates and inspects child care providers.

In Scotland childcare providers are monitored by Her Majesty's Inspectorate of Education, the Scottish Social Services Council, and the Scottish Commission for the Regulation of Care, where all childcare providers must be registered. Across the border, nurseries and childcare providers are regulated by Ofsted. The most recent report by Ofsted surveyed 64 childminders and 46 day-care providers and looked at the quality of nutrition provided. The report concluded that most childcare providers knew what constituted healthy eating and promoted and provided healthy meals to the children, with only a minority of providers failing to do so (Ofsted, 2006). On the other hand, a recent survey funded by children's food company Organix and the Soil Association gave a different picture, indicating that 17% of workers felt children were given unhealthy foods. More importantly, the report suggested that nurseries attended by children of lower-income families were more likely to serve unhealthy options and less likely to serve fruit and vegetables to children, than nurseries which were private, voluntary or state-maintained (Organix and The Soil Association, 2008). Essentially, the report called for nursery food to be regulated and monitored by a relevant government body to ensure a set standard of quality is met, and that staff working in nurseries are properly trained.

In relative terms, food provided to children in the school setting is far more regulated and monitored than food provided to younger children in childcare, which is peculiar considering that younger children are also more vulnerable. A recent article on *The Times* commented on the lack of regulation on the food provided to children in pre-school settings and nurseries, in sharp contrast to the extensive regulation surrounding school meals. The author states that *"you will hunt high and low for crisps or a sugary drink in a secondary school, but won't have to look far to find them in a nursery"* (Stacey, 2009). The article goes on to quote nutritionist Dr. Emmett from the University of Bristol who states that *"nurseries can help to even out the inequalities of diet by providing the same good healthy food to all children in their care"*. However, if the results from the survey by Organix and the Soil

Association are representative of the wider state of meals in nurseries in England, but also in Scotland, then nurseries may be reproducing, rather than reducing, the health inequalities which children already bring to the nursery from home.

A final drawback of policy initiatives based on children's diets while in childcare is the inability of such initiatives to improve the diets of children who are cared for through informal childcare arrangements. Parents use a vast range of childcare providers, and grandparents play a dominant role in childcare. Most parents combine some form of formal or informal childcare provision with the care offered by grandparents (Bradshaw and Wasoff, 2009). As such, grandparents also have a potentially influential role in the development of children's nutritional habits. Among parents interviewed in the Growing Up in Scotland survey, almost 40% stated that grandparents were the main reason why it was difficult to control the amount of sweet and sugary foods their children consumed. As grandparents often have a different upbringing and knowledge on issues of healthy eating, the GUS report suggested that they may be a useful group to address in educational interventions aimed at improving children's diets (Bradshaw et al., 2008).

Eating Solo

One more general shortcoming of most policy developments concerned with the improvement of children's diets is the failure to recognise that young children's diets cannot be changed in isolation from the diets of their immediate family members. Eating is inherently a communal practice which, especially for children in their early years, is largely shaped by the eating habits and meal patterns of their families. Focusing on an *infant* nutrition policy helps to mask the truly *family*-embedded nature of eating.

Investing in a *Family Nutrition Policy* could perhaps reflect more accurately the ways in which children and their parents and siblings actually go about eating food in their daily lives. To some extent, this criticism can be extended to the way international and Scottish policy has approached the promotion of breastfeeding. Policy documents and initiatives promoting higher rates of breastfeeding initiation and duration rarely reflect on the implications of breastfeeding for the mother, and this is discussed below.

Maternity Leave and Breastfeeding

In reviewing recent policy developments on breastfeeding and infant nutrition, it is puzzling to see how little reference and consideration there appears to be for the implications of breastfeeding recommendations on women's lives and their work commitments. As a recent, provocative newspaper article eloquently stated:

> *The debate about breast-feeding takes place without any reference to its actual context in women's lives. Breast-feeding exclusively [...] is a serious time commitment that pretty much guarantees that you will not work in any meaningful way. Let's say a baby feeds seven times a day and then a couple more times at night. That's nine times for about a half hour each, which adds up to more than half of a working day, every day, for at least six months. This is why, when people say that breast-feeding is "free," I want to hit them with a two-by-four. It's only free if a woman's time is worth nothing* (Rosin, April 2009).

It would be assumed that a comprehensive infant nutrition strategy would acknowledge the resources which mothers need to invest in breastfeeding and would seek to work in partnership with other policies affecting women's lives. To this respect, an infant feeding strategy could reflect on how its aims and targets can be further supported, through employment policy and more specifically statutory maternity leave. An exhaustive review of family-friendly employment policy is not within the scope of this paper, and existing comprehensive reviews point to the slow and fragmented progress that such policy is making in the UK (Dex, 2003; Dex and Smith, 2002). Nevertheless, since breastfeeding duration in relation to maternity employment leave will be explored in the forthcoming analysis, a brief outline of the current maternity leave and pay provisions is relevant.

Maternity leave and pay is not a devolved government responsibility, but is regulated at UK state level. The UK wide Statutory Maternity Pay (SMP) covers 6 weeks where the mother is paid 90% of her average weekly earnings. After the first six weeks, mothers are entitled to a flat rate sum of £124.88/week for the remaining 33 weeks. Mothers who do not qualify for SMP and may in this case be eligible for Maternity Allowance, at a weekly rate of £124.88 or 90% of average weekly earnings, whichever is smaller for 39 weeks (www.hmrc.gov.uk/paye/employees/statutory-pay/smp-overview.htm, accessed Dec 2010). Many mothers, and especially higher earners and single mothers, might find that following the 6 weeks leave paid at 90% of their wage, the weekly pay for the remaining period will accumulate to a significantly reduced income, and returning to work may be appealing for financial reasons. As discussed by Rubery (2008), a maternity pay policy which offers ungenerous pay rests on the idea that children are born in couple households and dual-earner families, assuming that mothers can and should be able to rely on the wage of a partner. The practical problems in combining work and breastfeeding, along with the spatial separation between mother and child makes prolonged breastfeeding after returning to work difficult to maintain, and a number of studies have explored this, as was discussed in the review of empirical research literature in chapter 1.

Information-based Initiatives

One feature which seems to be a common denominator of policy initiatives designed to increase breastfeeding initiation and duration rates and to improve children's nutritional habits in the early years is the heavy reliance on information-based initiatives. A lot of the recommendations and targets speak about 'providing advice', or ensuring parents are 'well informed' about the benefits of breastfeeding and healthy eating for children. A similar approach can be seen with initiatives which target school-aged children in the school context, many of which seek to 'educate' children about healthy and unhealthy food choices. As Lang et al suggest, "education and information are the default anti food poverty strategy" (Lang et al., 2009:271). The authors point to how:

> *"The dominant reflex of policy-makers has been to see nutritional challenges as ones that can safely be left to market forces and consumer choice. This assumes an omniscient consumer and perfect flows of information"* (Lang et al., 2009:129)

This reliance on information-based initiatives implicitly suggests that a lack of appropriate information on nutrition is a central reason why children have sub-optimal diets in infancy and the early years. Undoubtedly, a lack of awareness about what constitutes a healthy diet does contribute to children having poor dietary habits. But empirical evidence on parental feeding decisions has shown that parents often know what official recommendations on child nutrition are, but they are unable to put these recommendations into practice, either because they feel that other concerns regarding children's development is more important (Anderson et al., 2001; Backett-Milburn et al., 2006), or because they simply do not have the resources to buy foods which would be classified as healthy (Dobson et al., 1994; Dowler et al., 2001).

Furthermore, the information-based initiatives currently in place seem to focus extensively on *what* parents should feed their children, while failing to provide parents with advice on *how* parents should feed their children. That is, most initiatives focus on the types and quantities of foods children should and should not eat, with recommendations such as the 5-a-day being an example of this. To illustrate with an example, the Food Standards Agency *Eat Well, Be Well* online resource advises parents to feed toddlers full fat milk and dairy products, meat, fish, eggs and pulses, as well as a variety of grains and vegetables on a daily basis. Parents are also advised not to add salt or sugar to their toddler's food, and children aged 1 to 3 should not have more than 2 grams of salt each day (www.eatwell.gov.uk/agesandstages/baby/weaning, accessed Aug 2009).

But many parents who might know of these recommendations may not have the basic cooking and food management skills required in order to convert the recommended food items into appealing meals on a daily basis. Also, many parents also find it difficult to convince 'picky eaters' to eat foods which they initially reject, with healthy foods often being those rejected. These parents could benefit from advice on how to apply effective negotiation and disciplinary parenting techniques which would support them in managing meal-related tantrums in a more efficient way. Also, some policy recommendations could perhaps be better phrased in such a way so as to help parents in making feeding decisions. Realistically speaking, parents are unlikely to know what 2 grams of salt look like.

Ultimately, policies which aim to affect parental food choices need to be balanced with policies which affect the supply and pricing of food (Lang et al., 2009). This was acknowledged to some extent in the reviewed policy documents. Policy aiming for better public health has featured increased regulation of the advertisement, supply and pricing of alcohol and tobacco which have resulted in notable health improvements. Analogous regulation in the production, supply and advertisement of foods is somewhat behind in relative terms (McColl, 2009) and this route has often been proposed as a feasible and effective alternative for nutrition related public health policy (Caraher and Cowburn, 2005; Leicester and Windmeijer, 2004). This topic has been extensively debated in the media following a BBC Panorama programme investigating the potential use of food taxation to curb the growing epidemic of obesity and nutrition related illnesses (BBC Panorama programme 'Tax the Fat', 15/Nov/2010). Taxation and regulatory measures used to regulate tobacco could be applied to cheap processed food which may pose an equally concerning health risk. Threatened companies, however, have engaged extensively in lobbying against such potential measures, and policy change can be stifled by corporate interests (Lang et al, 2009).

Visible and Invisible Health Problems

Much of the policy discourse revolves around nutrition and children's weight. Obesity dominates child nutrition discourse as well as the media, as the one visible indicator of unhealthy eating habits. While the focus on obesity has raised the profile of, and resources invested in, promoting healthier diets among adults and children, obesity as a health problem should not overshadow other less visible consequences of poor nutritional habits.

Apart from obesity, poor dietary habits are linked to a vast range of nutrition related outcomes. In childhood these include diabetes, rickets, poor dental hygiene, problems with cognitive development and behavioural disorders. However, further down the line, poor diets and vitamin and mineral deficiencies have also been linked with multiple sclerosis, heart disease, and several types of cancers. Obesity is therefore a visible indicator of poor diets in children and adults, but this should not overshadow the long list of health problems which result at least in part from unhealthy eating habits among children and adults.

Policy and Morality

Finally, while this chapter has reviewed how policy initiatives have been and can be used to change society, it is worth reflecting on whether it is ethically acceptable for policy to be used as an intervention tool to modify human behaviour. As Lang et al suggest, “food policy is framed by moral and philosophical assumptions” (2009:12). Is it ethically acceptable for government to impose regulatory and taxation policies which limit the options available to consumers, thus not enabling them to chose for themselves between a full range of food options? With regard to information-based initiatives, it could be argued that initiatives which aim to educate individuals into making ‘correct’ food choices ignore any pre-existing cultural importance which food may have for such individuals. However, from the opposite side of the spectrum, governmental non-intervention could be portrayed as equally morally flawed in a context where policy leaves consumers exposed to a food environment which jeopardises their health. The case of tobacco could been used as a parallel example to reflect on whether a government has the moral responsibility to regulate and limit the consumption of unhealthy foods much like it limits the consumption of tobacco (Lang et al., 2009:128).

Next Chapter

As was noted in the critical review of empirical research literature, most studies looking at child nutrition in the early years are based in medical science disciplines. As such, children’s nutritional habits have been relatively under theorised. A key aim of this thesis was to undertake an analysis of children’s diets which would be informed by and framed within relevant social theory. Thus, the next chapter engages critically with key ideas in social theory which can help to explain parental health behaviours and infant feeding decisions, and explain how children's eating habits develop through shared experienced of food in everyday family life.

CHAPTER 3
Theorising Child Nutrition: developing a framework for research questions

Introduction

> *"Nutritionists know that the palate is trained, that taste and smell are subject to cultural control. Yet for lack of other hypotheses, the notion persists that what makes an item of food acceptable is some quality inherent in the thing itself. Persistent research into palatability [...] seeks to screen out cultural effect as so much as interference. Whereas the cultural controls on perception are precisely what needs to be analysed."* (Douglas 1978:59).

A brief look at the review of empirical research literature in chapter 1 reveals that the majority of existing evidence on child nutrition is based in medical science disciplines. Empirical research on children's nutritional habits which reflects and contributes to social theory is harder to find. It is one of the overarching aims of this thesis to contribute to empirical literature which looks at children's diets from a sociological angle. It is hoped the analysis in this thesis will go beyond a standard medical understanding of the relationships between food and health, and move towards an analysis informed by social theory which is better able to explain the social meanings of different eating patterns as they evolve in everyday family life. The theoretical concepts reviewed in this chapter provide a social narrative which can help to flesh out the primarily quantitative output of this research. This should support an analysis which does not only describe *what* children's eating habits are like, but which also theorises on *why* children's eating habits are as they are.

There are essentially four theoretical pillars discussed in four sections in this chapter which have been used to frame the research enquiry and subsequent discussion and interpretation of findings in chapters 5, 6, 7 and 8. The first section draws on theories of social constructionism, the civilisation of the body, and the management of the project of the self, in order to look at the symbolic meaning of eating habits and their relevance in defining social identity. The second section looks at theories of risk, and responsibilisation, and at the surge of medicalised and regulated child nutrition and concepts of power-knowledge. These ideas are used to explain how in light of a growing fear of nutrition-related health risks public health policy is increasingly encouraging individuals to take responsibility for their own health. The third section reflects on theories of human capital to explain why different social groups respond differently to perceptions of food risks and develop different health behaviours and tastes for food. The fourth section counterbalances structuralist human capital theories by drawing on the importance of agency and choice, but it also highlights how real material constraints, often overlooked in policy, may make healthy eating unfeasible for many families from disadvantaged backgrounds. The chapter concludes by building on the above narrative in order to outline five theoretically informed research questions which guide the enquiry of this doctoral research.

Social Constructionism and the Project of the Self

Socially Constructed Bodies

Breastfeeding and eating can be understood as purely biological processes related to human function. But human beings attribute social meaning and importance to all biological processes and this shapes the way we understand the relationship between food and the body. Perceptions of the body and food are overflowing with symbolic significance, and while the processes of eating and feeding have a ‘biological existence’, they are also perceived and understood in the context of everyday life through their ‘symbolic existence’ (Foucault, 1986).

To fully understand the development of children’s nutritional patterns within the habits of family life, it is important to reflect on how the body is constructed through social discourse and is a medium of social meaning (Douglas, 1970). Douglas’ concept of ‘natural symbols’ highlights how bodies mediate social meaning in society. Goffman’s theorisation of the presentation of the self in everyday life re-iterates this idea, stressing how body management is central to the maintenance of social relations and the body is a vehicle for social identity (Goffman, 1969).

Goffman’s concept of ‘shared vocabularies of body idiom’ suggests how shared ideas about bodily appearance and behaviour structure people’s management of, and behaviour in, the body. These ideas, however, consider the ways in which *adults* process and interpret meaning. It is unclear how they relate to children, particularly in the early years, when children’s participation in producing, or even understanding, social meaning is limited. It could be argued that the production of social meaning very early in life is *mediated* by children’s parents on children’s behalf. The choices parents make about the management of children’s bodies determine how children’s social identities are perceived and will be remembered by significant others.

Social constructionism can perhaps also help to explain the relatively modern interest in children as a social category in their own right. Childhood had only recently been understood as a separate state of being, clearly delineated from adulthood, and a state characterised by vulnerability and need. Perhaps this is why traditionally, social theories of human behaviour have been generally silent on childhood (James et al., 1998). Also, only recently have children been portrayed in policy and media as the foundation of future society, and this has further justified the increased attention paid to this group.

Managing the Social Body

Given that bodily meaning is *constructed* through social discourse, the meaning of bodies can also be *changed* and *manipulated* through social discourse. An awareness of the social existence of the body, goes hand in hand with a heightened reflexivity and need to regulate the physical body and to manage its symbolic meaning (Turner, 1992). Elias's theory of 'civilised bodies' (1982) purports that, in search for distinction, humans internalise socially constructed body management norms and reflexively monitor their behaviour.

The body is thus conceptualised as an unfinished project which can be developed to meet the expectations of society, a concept Giddens has coined as 'the project of the self' (1991). The pursuit of a healthy lifestyle, through good nutritional habits, physical exercise and the individual prevention of ill-health, are of particular importance for the project of the self and these behaviours are portrayed in public discourse as a moral obligation to society (Wall, 2001). In light of the highly social existence of the body, our ways of interpreting and acting within our bodies in physical terms is socially structured, and different societies give rise to different 'techniques of the body' (Mauss, 1973 [1935]). Food is not an exception, and the management of eating habits is one reflection of the management of the project of the self.

Nutrition and Children's Social Bodies

The above concepts are important in explaining how *adults* perceive and act within the social body. But these theories do not adequately account for how *children* understand, and to what extent they can contribute to, the social construction and management of the symbolic meanings of their bodies and the symbolic meaning of their eating practices. Children come into the world unable to make active choices on nutrition, for example with regard to preferences for formula or breast-milk. They are only able to make passive judgements on the nutritional options they *are* offered by expressing a like or dislike, initially through non-verbal communication. But despite their limited participation in food-decisions, the feeding choices made by parents, and primarily mothers, do have symbolic and physiological implications for the mother and child-duo. The way a mother feeds her infant at birth has a symbolic significance not only for her as a mother, but also for the child as a growing future individual.

In a sociological analysis of mothers' infant feeding decisions, Murphey et al (1998) argue how most medically oriented research on food and health has overshadowed the social and symbolic importance of food-related decisions. A baby's nutritional needs for breast- or formula milk are a manifestation of the biological dependency of the child on the parents for survival, but also a symbolic manifestation of the child's social dependency on the parents, and more particularly the mother (Murphey et al., 1998). This can be seen as a transitional stage where the infant is no longer *one* with the mother, and not yet an independent individual (Fildes, 1986). It is particularly during this liminal stage of existence that the actions and choices of the parents, and particularly the mother, contribute to the construction of the social identity of the child at a time when the child can only make a limited conscious contribution to its own construction of the self.

For the mother, as well as the father, decisions on infant feeding are made on a backdrop of current social discourse which often portrays breastfeeding as *the natural way* (Wall, 2001). Breastfeeding is also part of the social definition of *good motherhood* and is linked to 'appropriate' gendered practice (Connel, 1987). Infant feeding practices acquire independent meaning and morality which put to shame deviant mothers who do not live up to the shared understanding of ideal motherhood (Murphey, 1999). A failure to live up to the expected social identity of motherhood renders mothers vulnerable to *stigma* and embarrassment (Goffman, 1968). Women's perceptions of the female body and sexuality, and opinions regarding the appropriateness of nudity also influence feeding decisions and the way the general public perceive and react to public breastfeeding. The importance of public opinion has been underrated and many mothers find themselves pressured to breastfeed, yet pressured *not to be seen* to breastfeed (Carter, 1995).

Much like babies feeding on milk symbolises attachment, weaning symbolises the child's detachment and separation from the mother. Weaning has historically represented a transition from infancy to childhood as a *rite of passage* which marks the end of the special relationship of dependency between infant and mother (Fildes, 1986). As a transition it may trigger a range of emotions, and parents, particularly mothers who are breastfeeding, may be sad to see this period of infancy come to an end. On the other hand, parents may anticipate to see their infant grow and develop. Some parents fear that delaying weaning can be detrimental to the child and prolonged bottle/breast-feeding may 'infantilise' the child and encourage emotional dependency (Dettwyler, 1995). Parental awareness of the importance of avoiding premature weaning of infants may often compete with a parental desire to see children 'progress' and develop, and an anticipation to see children move onto *real* food (Murphey et al., 1998).

Currently, health policy recommendations provide weaning guidelines which aim to optimise children's *physical* development. However, parental weaning decisions are highly influenced by the perceived *social* implications that initiating weaning may have for a child's social identity. Early weaning, while discouraged by health authorities, is often considered by parents as the appropriate response to a child who appears to be curious of 'grown-up' food and unsatisfied with breast- or bottle-milk. Parents may justify premature weaning as a way to support children in moving on from foods and methods of eating (breast or bottle feeding) which are socially associated to infancy. As Murphey et al (1998) state, successful health policy needs to recognise the 'symbolic and practical roles which food plays', and simply educating parents about nutritional 'cause-and-effect' information will not necessarily change weaning practice.

As for breastfeeding and weaning, eating habits in later childhood and adult life carry symbolic social meanings which are continuously evolving products of their cultural context at a given time and place (Mead, 1949). Our meal habits revolve around structured patterns and rules which people become socialised into adopting (Douglas, 1972). As Mary Douglas stated, *"the rules of the menu are not in themselves more or less trivial than the rules of verse to which a poet submits"* (Douglas, 1972:80). As eating is saturated with normative and moral significance, in certain respects *what* we eat is less important than *how* we eat.

Family Meal Rituals

The growing emphasis on the ‘project of the self’ is closely knit to the growing importance of the individual in modern society. The growth of individualism is often held responsible for the decline of the traditional family (Giddens, 1991). With regard to food, individualism has been pessimistically associated with the loss of the family meal and with the rise of fragmented and detrimental eating (Mintz, 1985). Developments in food technology have reduced the skill and time required to prepare a meal and, theoretically, decommodified family members from each other and from the previous system of food production and consumption in the home.

However, the importance attributed to individualism may be slightly overlooking the inherently communal nature of eating. In practice, food consumption is still shared and the effects of individualism have been overstated. While family meals may be occurring less often than before, eating together is occurring more often in new contexts, such as in work- or friendship networks (Mennell et al., 1992). Even in the family, food is still a means for togetherness and is associated with numerous rites of passage which are public and shared, such as wedding or birthday meals, or festivity specialities (van Gennep, 1960).

Caplan suggests a more optimistic interpretation of social change, shifting the focus away from the loss of an old family-based system of food consumption, towards the emergence of a new more tailored system of ‘polyphonous diets’ (Caplan, 1994). Selective food choices, as part of the cultivation of the self, contribute to the social construction of identity. As Caplan states, food is *“a metaphor for our sense of self, our social and political relations, our cosmology and our global system”* (Caplan, 1994:25). As such our food choices are determined by our social relationships in society, while they simultaneously shape and signal to others our sense of identity.

To reiterate the problematic absence of childhood in this account, more could be done to explain how children’s food choices, if they can be called as such, contribute to the construction of their own social identity. To some extent children simply respond to the food choices made *for* them, particularly in infancy, and by default of this logic they would then embody the social identity constructed by their parents on their behalf. But it appears unsatisfactory to think of children as mere passive recipients of symbolic meaning. These theories could be developed to account for how and when children become *agents* in the social construction of the body through among other things regulating their eating habits.

Risk, Responsibility and Health Professionals

The ways in which the relationship between food and health is understood, and the processes by which social identity is constructed and defined take place in a social setting saturated with a broader concern about *risk*. Modern societies are saturated with risk and the social construction and perception of such risk influences the ways in which individuals understand and act with regard to food, eating and health (Beck, 1992; Murphey, 2000). The saturation of globalised environmental dangers coupled with the inability of governments to fully or adequately protect individuals from these dangers has nurtured a rise in the individualisation of responsibility for the protection of the body (Murphey, 2000). Many elements of current public discourse and health policy which encourage the individuals to be responsible for their own health relate to Garland's responsibilisation theory with regard to crime control (Garland, 1996).

Garland's theory was devised to explain the increasingly less interventionist role that governments started adopting with regard to crime prevention when faced with growing criminality. He argued that, faced with limited resources for combating crime, government crime policy gradually transferred more responsibility for crime prevention to the individual. As such, individuals are increasingly expected to protect themselves by avoiding situations or behaviours which may result in them becoming victims of crime.

A parallel argument can be made with regard to how increasing health risks associated with poor nutritional habits coupled with dwindling resources for public health policy have led to the responsibilisation of the individual with regard to the pursuit and maintenance of good health. This phenomenon is particularly evident in nations with a history of liberal politics, which stress the importance of self-government and individual responsibility towards the body and the self (Wall, 2001). In the current climate, public discourse seems to be more about individual action and choice and less about the collectively shared environment. On the other hand, if legislation made unhealthy food options unavailable and modified the nutritional environment which families and children are faced with, this would make adhering to a healthy lifestyle easier, and less like swimming against the current. But implementing such measures could be interpreted as the government adopting a moral role in restricting the consumption of 'bad' foods, making this route a difficult one to follow (Lang et al., 2009).

Perhaps the growth of responsibilisation in public health policy is what is driving excessive reliance on healthy eating initiatives which aim to change the behaviour and choices of individuals, by offering advice and information on nutrition. Thus, individuals have become increasingly responsible for making nutritional choices which favour a healthy future, while the supply and production of food is not expected to support this goal. But if individuals were living in food environments which themselves promoted healthy eating, they would not have to be as cautious in, or consciously responsible for, their everyday food choices in order to be healthy.

Children and Risk

Children have not been immune to the threat of *risk*. In fact, the conceptualisation of childhood as the precursor of adult existence has come hand in hand with a heightened sense of potential risks associated with childhood (Stainton Rogers, 2001). However, while children are perceived as highly vulnerable to *risk*, the responsibility to ward off danger is traditionally passed on to their parents or nearest adult carers. When children are too young to take responsibility for their own body projects, that responsibility is perceived as being an extended responsibility of the parent (Murphey, 2000).

The risk-culture surrounding the process of child-rearing, breastfeeding and child nutrition has entailed a heightened involvement of the medical profession in the field of child nutrition. It could be argued that a tendency towards medicalisation gave rise to a heightened perception of risk, or that the 'risk society' provided medicalisation with an opportunity to flourish. It is probable that the two phenomena developed together, and the perception of risk goes some way in explaining the growth of public health policy. In line with Foucault's concept of power-knowledge (Foucault, 1980), the growth in risk-culture affecting how child nutrition is perceived has legitimated the promotion and facilitated the social acceptance of disciplinary educational policy initiatives.

Breastfeeding

The rhetoric of risk is no less evident in breastfeeding discourse. Maher observes how breastfeeding is presented as 'the panacea for the ills of childhood' (Maher, 1992a:153) while other variables associated with broader social inequalities are ignored. A form of 'social anxiety' is created around the practice of breastfeeding, and mothers are pressured to secure the *successful* development of their child, for which breastfeeding is of paramount importance (Blum, 1993). The list of health problems associated with children *not* being breastfed seems daunting and ranges from respiratory illnesses to obesity and problems in cognitive development.

In public discourse, however, critics of the breastfeeding propaganda argue that the benefits from breastfeeding for child health have been exaggerated, that the evidence supporting breastfeeding is weak, and that the costs of breastfeeding for the mother outweigh the health benefits for the child. In a controversial article in The Atlantic, journalist Hanna Rosin states :

> *...when I look around my daughter's second-grade class, I can't seem to pick out the unfortunate ones: "Oh, poor little Sophie, whose mother couldn't breast-feed. What dim eyes she has. What a sickly pallor. And already sprouting acne!"* (Rosin, April 2009).

The fact that many public health recommendations often change does not help to give current breastfeeding recommendations credibility among the lay audience. With breastfeeding, this was particularly the case following the recent publication of an article which reviewed the evidence informing current WHO recommendations for 6 months of exclusive breastfeeding (Fewtrell et al., 2011). The controversial article concluded that the evidence upon which the current recommendations are based is weak, and advised towards weaning infants onto solid foods from 4 months onwards. Whether this will lead to a change in official breastfeeding recommendations remains to be seen.

The response to the perceived risks surrounding formula-milk and breastfeeding has been a progressive medicalisation and regulatory monitoring of these processes. Contemporary health policy actively promotes ‘solutions’ for low breastfeeding rates based on increased education of the public drawing on medical evidence in support of breastfeeding. Maher suggests that this medicalisation has attempted to ‘subject breastfeeding to factory like regulation’ (Maher, 1992b:32) and promoted breastfeeding as a mechanical lever to achieve successful child growth. Also, Rosin suggests that this medicalisation has led to a *“national obsession with breast milk as a liquid vaccine”* (Rosin, April 2009).

The reviewed empirical research literature indicated that journalist Rosin is not alone in feeling this way, and the detrimental impact of ’excessive’ information and interference from the medical profession should be taken into account in policy making. As has been suggested in relation to informed choice and patient decisions in the context of cancer care, the normative cultures which can be read between the lines of information leaflets can result in individuals *complying*, rather than *choosing* to act as is advised by health professionals (Jepson et al., 2005), and infant feeding advice is no exception in this case. For some mothers, the intensive promotion of breastfeeding is unwelcome and potentially also counter-productive if it results in mothers being put-off from breastfeeding. On the other hand, the original move *away* from breastfeeding to formula milk was also a product of public health policy propaganda, which proved to be quite successful. Thus, the medicalisation and regulation of infant nutrition is not a new phenomenon. If all infants were fed on identical formula milk from only a handful of manufacturing companies that would bear far more resemblance to 'factory like' baby feeding, than having each baby feed on different milk from a different mother.

Weaning

The process of weaning has not been impermeable to the construction of risk. As Fildes explains, in the late 18th century with industrialisation and the gradual move of women into employment, children started gradually to be weaned at a much earlier age (1986). The onset of early weaning, based on a diet traditionally used for weaning older children, brought with it a rise in weaning-associated diseases and health complications, such as rickets and slow growth. Whereas children weaned prior to this period, at the age of 2 or 3 years of age, could eat a diet similar to that of the rest of the family, the increasingly younger age at which infants were weaned entailed that children had to follow special 'weaning' diets, which were different from breastfeeding, but not quite the same as an adult diet (Fildes, 1986).

As with breastfeeding, increased medicalisation has been one of the responses in dealing with the real and perceived risks with weaning. Historically, the medical profession was concerned with excessively prolonged weaning rather than pre-mature weaning, during a period where professionals, particularly based in social psychology, warned that prolonged attachment to the mother through breastfeeding could have detrimental implications for the child's independence and development (Fildes, 1986). After the changes and complications following the 18th century, the medical profession has been primarily concerned with monitoring and improving children's transition from milk to 'solids'.

The FSA's *Eat Well, Be Well* website offers a detailed sequence of steps for appropriate weaning, and warns against potentially harmful foods, such as peanuts and fish. Supermarkets are well stocked with jars of 'baby-food', made of pureed 'adult food' which has been given a 'baby-safe' stamp of approval. The official website for food manufacturer Heinz, which also produces ready-made baby-food products, (http://www.heinz.co.uk/products/heinz_baby_food.aspx, accessed 16/Oct/2009), reassures customers that *"all our baby food is triple-tested for quality, safety, purity and nutrient value, so you know you can trust it completely"*. The adjectives used to describe the baby-food render mere home-cooking inadequate, and one may wonder whether cooking for babies is a task to be undertaken only by 'trusted' qualified professionals working in a sterilised environment.

Eating

It follows that a heightened concern about *risk* has also affected the way we conceive children's eating more generally. This is to a lesser extent a concern about food being prepared in a 'safe' way, and more a matter of the health risks involved in consuming certain foods. The most obvious result, however, is the market growth for 'low-calorie', additive-free, and whole-grain food products. The rise in real, but also self-diagnosed food allergies is another manifestation of this 'food fear'.

Childhood nutrition is not an exception and there is a growing 'food fear' and heightened awareness of the potential health risks for children in eating certain 'risky' foods. The risks involved can be thought of as either *immediate* or *future* risks. The immediate risks from food regard the dangers in eating potentially allergenic foods such as peanuts, or risks related to hygiene in food storage and preparation. The future risks are those relating to the children's systematic over-consumption of foods considered unhealthy. Examples of future risks include the much discussed obesity epidemic, increasing rates of diabetes mellitus, heart disease and cancer – notably these are primarily, although not exclusively, *adult* illnesses partly rooted in childhood habits.

A perceived heightened sense of risk in children's eating perhaps explains the rise in health and safety regulations in this field. More importantly, the perceived risks surrounding childhood and food have promoted a growth in children's food policy which endorse and condemn different diets. In turn these are legitimated by stated underlying social goals of health improvement and aims of eradicating health inequalities in society (Mennell et al., 1992). The Scottish Infant Nutrition Policy currently being developed which will make recommendations based on medical evidence is an example of this phenomenon. Notably, while children's nutrition is being scrutinised and targeted, the practical implications of this trend are felt primarily by parents. As children cannot, a least during the very early years, be held responsible for their own nutrition, this calls for parents to make preventative health-conscious nutritional choices *for* their children in order to protect them from immediate and future dangers of poor nutrition.

Theories of Capital and Social Stratification

If these theories of human behaviour provided a universal fit for all individuals, it would be safe to assume that there would be no variation in the ways different people interpreted and managed their own social selves, and risk-awareness would be a static variable influencing the eating habits of a socially homogenous population. Clearly this is not the case. What remains to be explained is why different people, and particularly why different *groups* of people respond to the 'stimulus' of risk differently and why different social groups respond differently to the management of their own body projects. If all parents are exposed to notions of risk-avoidance and are subject to increasing responsibilisation in achieving good health for themselves and in their children, it remains to be explained why different people eat and feed their family members so differently.

One argument is that different approaches to infant and child nutrition arise from different achieved success in taming the effects of nature through nurture. That is to say that our bodies are wired to prefer foods high in fat and calories which would, in a context of scarcity, favour survival. The craving for calorific foods and abstinence from tiresome physical activity is rooted in the genetic makeup of humans, while the desire to eat 'healthy' foods of low energy-density and the desire for physical activity has to be acquired and nurtured (Fischler, 1980; Fischler, 1988). While, undeniably, nature plays a major role in food choices and preferences, it is proposed that the observed differing nutritional patterns in the population are more a product of a conflict between ‘nurture vs. nurture’, rather than ‘nature vs. nurture’. That is to say that nowadays, both healthy and unhealthy nutritional habits are learned and the two are simply a result of, on the one hand, different attitudes and beliefs about food, and on the other, different options available in contrasting social and material circumstances.

Human Capital and Health

The rhetoric of risk and the responsibility for self-management, along with the disciplining effects of medicalisation on motherhood and child nutrition colour aspects of human behaviour at the broader societal level. Yet, perceptions of, and responses to these social norms differ between different social groups. Some individuals and families are more prone to reflect, assimilate, and reproduce these norms in their own behaviour than others. Different theories of ‘capital’ have been used to explain differences in socially stratified human behaviours.

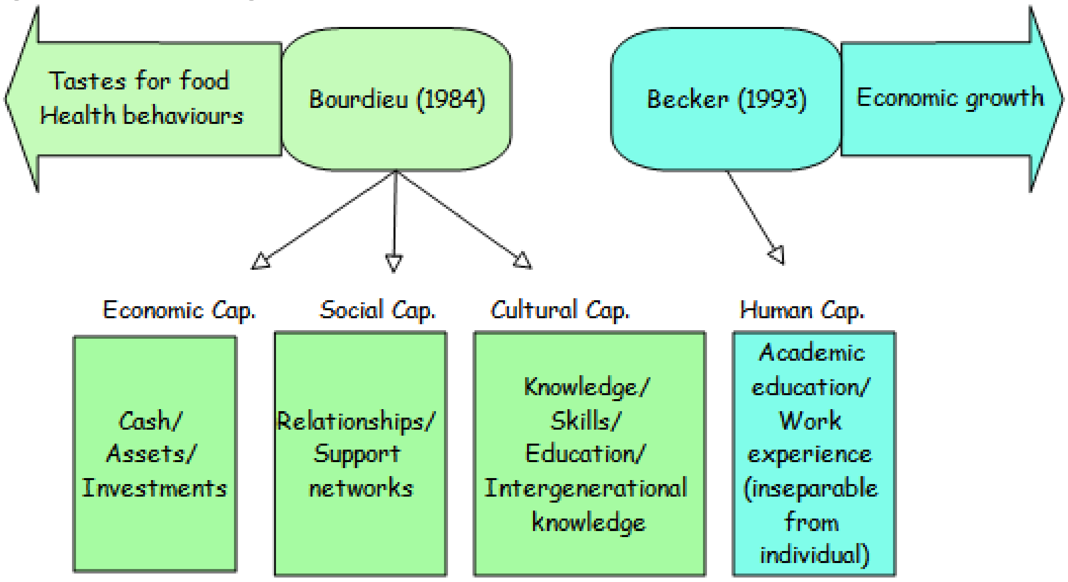
In social research, theories of *social* capital have been widely used to point to the ability for social networks to provide an antidote to modern societal problems (Bourdieu, 1986; Putnam, 2000). A special feature of social capital is that it emphasises the value of relationships between people, rather than characteristics intrinsic within people. As such, it has often been applied in research discussing the role of social capital in solving community based and interpersonal problems, such as crime (Portes, 1998; Putnam, 2000), and problems with educational attainment and school drop-out rates (Coleman, 1988). Theories of social capital have however been less commonly applied to discuss how such capital affects individual dietary choices and food preferences. Other forms of capital, such as economic capital, physical capital, cultural capital, have been coined over time, and discussed to some length primarily by Bourdieu (1986), although these have been applied and reproduced to a relatively smaller extent in subsequent work, and rarely in isolation from either social or human capital.

Theories of *human* capital were particularly prominent in economic theory, and were initially elaborated upon by Schultz (1963) and Becker (1962), who discussed the economic value of investing in education. In general terms, human capital has been defined as a resource intrinsic to and indivisible from the individual which results from investment in the education and training of that individual (Fleischhauer, 2007). Human capital applications have primarily been concerned with the economic argument for investing in such capital and the potential that such capital has for creating economic return and growth, largely overlooking other non-economic benefits of such investments (Fleischhauer, 2007). Human capital theories are intriguing as they highlight the importance of investing in the personal development and improvement of the individual, through education and apprenticeship.

While human capital theories have flourished in economic theory, their potential to explain non-economic outcomes, such as health behaviours or food preferences, has not been fully developed. Among the different applications, theories of capital have rarely been linked to individual health behaviours, and only work by Bourdieu (1984) and Bourdieu and Passeron (1977) have discussed the role that different forms of capital play in influencing individuals' food preferences and 'tastes'. However, theories by Bourdieu and Passeron place relatively less emphasis on education as a form of investment in human capital, and fail to clarify whether formal education reproduces or helps to eliminate social inequalities (Sullivan, 2002:153). The ideas on human capital discussed by Becker (1993) complement those of Bourdieu and Passeron, since Becker stressed how education can produce human capital which promotes health preventative behaviours in individuals, thus pointing to the possibility for human capital to lead to *change* in health behaviours and health outcomes over time and across generations. The concept of human capital proposed in this thesis, amalgamates the concepts of 'capital' discussed by Bourdieu (1984) and Becker (1993), and aims to provide a dimension through which to explain and understand why different health behaviours are socially stratified.

Bourdieu's typology sets forth three different types of capital (1984). These are, economic, social and cultural capital which drive the stratification of power in society. Economic capital is defined as command over economic resources, and cultural capital is defined as an amalgamation of knowledge, skills, and education which individuals accumulate over time. Bourdieu's social capital is defined as the resources linked to social networks and interpersonal relationships, and is not dissimilar to the social capital discussed by Putnam (2000). Becker's concept of human capital (1993) has some similar traits to Bourdieu's cultural capital. Becker argues how unlike economic capital, human capital is embodied within, and inseparable from, the individual who possesses such capital. Human capital, he argues, is the product of time and money invested in *"schooling, a computer training course, expenditures on medical care, and lectures on the virtues of punctuality and honesty"* (Becker, 1993:15). The two approaches to capital have been summarised in figure 3.

Figure 3 Comparing Bourdieu and Becker on theories of capital



The definition of human capital used for the purposes of this thesis amalgamates the ideas contained in Bourdieu's cultural and economic capital and Becker's human capital. Bourdieu's social capital is not considered to be a central element in the proposed conceptualisation of human capital, particularly because it has been argued to be a product of cultural and economic capital and not a good indicator of differential health behaviours when controlling for indicators meant to capture economic and cultural capital (Dahl and Malmberg-Heimonen, 2010). At a personal level, the definition of human capital proposed in this thesis captures the different micro-cultures which rest on different aspirations, hopes, self-confidence, and beliefs about what achievements are possible or plausible in life, attitudes towards health and importance given to investing time and resources in self-improvement.

Bourdieu's and Becker's theories of different types of 'capital' have different strengths and weaknesses, and none of the two concepts on their own was considered to be capturing the proposed notion of human capital in a satisfactory way. It is proposed that Becker's strengths lie in the emphasis he placed on the importance of education as being a central component of human capital. He argued that *"education and training are the most important investments in human capital"* (Becker, 1993:17). However, Becker was predominantly concerned about how investing in human capital, by investing in education, could be a way to improve economic productivity of individuals, but he did not engage in how such human capital related to individual health outcomes. His understanding of the relationship between health and human capital was not very well formulated, making it difficult to apply his notion of human capital to research explaining health behaviours. When discussing the central importance of education in defining human capital he illustrates how investment in human capital can have positive returns in terms of health improvement. On the other hand, during more general application of the term, health is defined as a component *of* human capital, alongside education. Perhaps this points to an underlying cyclical nature of health in relation to human capital, whereby possessing more human capital is likely to overlap with better health, and a desire for further health improvement and maintenance.

Bourdieu spoke extensively of the links between different types of capital in relation to health behaviours and health outcomes, which partly explains why his theories are often discussed in sociological literature on health and illness. He argued that social, cultural and economic capital generate the acquisition of particular *tastes* which result in the transformation and embodiment of such capital into physical capital (a different capital, separate from the three forms discussed in his typology). Physical capital is defined as body shape, gait and posture and broader general health (Bourdieu, 1984) and can be produced by pursuing healthy lifestyles (Bourdieu and Passeron, 1977). The idea of developing a *taste* for production of physical capital is important because Bourdieu's conceptualisation of physical capital entails that it cannot be directly transmitted or inherited, and is a product of the other three forms of capital (Shilling, 1993). Interestingly though, increased attention is being given to the eating habits of pregnant mothers in light of evidence indicating that un-born children can be negatively affected by poor maternal diets. It could therefore be argued, contrary to what Bourdieu and Passeron suggest, that physical capital *can* be inherited in children in the womb, as a result of the food choices of the pregnant mother.

The challenge with Bourdieu's cultural capital is that it has been fairly vaguely defined, and the importance of education for cultural capital is unclear (Sullivan, 2002). Unlike Becker, Bourdieu does not seem to place extensive emphasis on the role that education may have in shaping cultural capital, and it is also unclear whether Bourdieu perceives formal education as a mechanism for social reproduction or for social mobility (Sullivan, 2002:153). Ultimately, the different types of human capital shape what Bourdieu refers to as *habitus*, a set of culturally learned and acquired 'dispositions' which colour the way individuals perceive their world and act within it (Bourdieu, 1990). Bourdieu argues that education and occupation are crucial elements in the formation of habitus, and as such it is often inherited and passed on between generations. However, it is unclear what the differences are between habitus and cultural capital, and it has been argued that habitus as a theoretical construct is too vague to be useful for empirical research, while cultural capital is theoretically more solid and useful concept (Sullivan, 2002).

When it comes to the issue of operationalisation, human capital is closely linked to, although not fully explained or captured by the educational qualifications, financial resources, and occupational characteristics of an individual. Thus, the above three indicators are of interest when researching health behaviours, both for the directly measured information they capture – such as disposable income, or educational attainment – but primarily for their ability to capture the underlying latent and possibly un-measurable human capital which influences health behaviours in ways not fully accounted for by the indicators themselves. Thus, research in public health and sociology of health and illness has often sought to control for the latent variable described here as human capital by controlling for educational qualifications, incomes, and occupational status of individuals or families (Liberatos et al., 1988, Krieger et al., 1997).

Issues of collinearity deserve due consideration, since educational, occupational and income-related characteristics often go hand in hand. However, while these three indicators often overlap, they should not be assumed to be interchangeable, and different indicators may capture different aspects of a latent human capital variable in different research settings (Geyer et al., 2006). Also, the gender and age of research participants, and the nature of the health issues in question, may warrant the preference of one indicator of human capital as opposed to another (Liberatos et al., 1988, Krieger et al., 1997).

Human Capital and Food

Among other things, Bourdieu used the concept of cultural capital to explain socially stratified differences in *tastes*, including differing tastes for food (Bourdieu, 1984). In contrast, Becker's work does not elaborate on the relationship between human capital and eating habits. Bourdieu argues that cultural capital, is what drives human beings to learn to make 'virtue of necessity' by becoming culturally predisposed to desire what they can obtain, and dislike what is unavailable to them. Through this framework it follows that, less well-off social groups consume larger quantities of less expensive and less healthy items (processed meats, sugary foods) compared to better off social groups, not only because their finances may not allow them to do otherwise, but also because these foods have come to be considered appropriate or desirable choices given the social and cultural heritage of these groups. Thus, the dietary habits of any individual, if understood as the product of cultural capital, can be considered to be a result of neither conscious nor unconscious choices.

A short biographic article by journalist Laurie Taylor published on the BBC website provides a vivid illustration of becoming aware of cultural capital and its effects on the acquired *tastes* for food As he vividly recalls:

> *"It was the egg and chips which first made me realise that Jim lived in a different world [...]. Jim and his dad were working class. And members of the working class at that time thought it completely natural to eat five o'clock in the afternoon. But even more, as members of the working class they took it for granted that everyone else ate at that time and would happily regard egg and chips and tea as the perfect meal for the occasion. How different from my own dear lower middle-class home where eating a heavy meal in the late afternoon would have been regarded as dangerously close to a satanic rite. Neither would my mother have ever tolerated egg and chips on her dinner table, or, even, in her wildest dreams, have allowed any member of the family to accompany any meal at all with a mug of steaming tea"* (Taylor, 28/08/2009).

Taylor's story is a perfect illustration of how different culturally acquired food preferences and meal habits are fully coherent and unquestionably logical within each social group, and only through the immersion in a different food culture did Taylor realise the extent to which every aspect of eating, from food choice to meal times, is culturally determined.

Breastfeeding

Breastfeeding is more common among mothers with more social and educational capital, who are more prone to attempt to live up to socially constructed ideas of 'good' motherhood. Through breastfeeding, mothers are taught that they can transmit a *predisposition* for higher physical capital in the child in later life, by lowering the child's chances of respiratory illnesses and obesity, and possibly raising the child's IQ by breastfeeding. Generally, people of privileged backgrounds are more likely to believe they are in control of their own health than more disadvantaged social groups, and they can exercise this control by anticipating the future consequences of their present actions and chose healthier lifestyles (Shilling, 1993:132,160).

Referring back to Hanna Rosin's article, which discussed the pressures placed on mothers as a result of the current breastfeeding propaganda, she states that: *"in certain overachieving circles, breast-feeding is no longer a choice – it's a no-exceptions requirement, the ultimate badge of responsible parenting"* (Rosin, April 2009). Mothers of 'overachieving circles', presumably those with more education, better jobs and higher incomes, are more likely to feel pressured by the public expectation for them to breastfeed, and more likely to pressure each other to this respect. The promotion of breastfeeding often overlooks how mothers struggle to juggle commitments to work, housekeeping and childcare of other children. As Murphey states, essentially *"the 'good mother' is one who maximizes physical and psychological outcomes for her child, regardless of personal cost"* (Murphey, 2000:291, quotations in original). Thus, at times, the desire or self-imposed duty to breastfeed may come at the cost of the mother's own psychological well-being.

Weaning

With respect to weaning, theories of human capital may be employed to explain why different social groups wean their infants onto a solid diet at different times points. As was discussed earlier in the chapter, parents make decisions regarding weaning after weighing up their own parental instincts and conflicting information from government health recommendations and advice from family and friends. In fact, parents often state that they may knowingly wean their child earlier than recommended because they feel their infant is hungry and dissatisfied eating 'just milk'.

Mothers whose decisions about childrearing are shaped within the context of abundant human capital may be predisposed to be more keen on breastfeeding, and may be more likely to actively search for official recommendations and medical advice regarding weaning. More importantly, they may be pre-disposed to give more weight to advice on weaning from health professionals, even when this contradicts familial advice. This is not to say that mothers who are better off do not attribute symbolic meaning to the processes of weaning. Instead, these mothers' interpretations and perceptions of the symbolic meaning of weaning might be more open to the influences of advice from health professionals than is the case for mothers from more disadvantaged backgrounds.

Eating

Much like for breastfeeding and weaning, parental human capital also has implications for families and children's nutritional patterns in later childhood. The conscious pursuit of optimal health through preventative nutritional choices and the subconscious acquired *tastes* which parents have for certain foods and eating habits are socially inherited by children. A desire for 'healthy eating' must be *cultivated* and *nurtured* in children, as they are taught the value of pursuing optimal health. The conscious choice to eat healthy foods as a means to a healthy life is an acquired *taste*, metaphorically speaking, and needs to be preceded by *healthy thinking* which, like eating, people are socialised into.

It is during the early years that parents come to act as *mediators* of social meaning for their children's bodies and food choices. Parents have a central role in contributing to how a child's identity and body develops and is perceived by others, and whether a child grows to be perceived as an 'active child' or a 'fussy eater'. In the short term parents may hope that good feeding decisions will promote good health during childhood. In the longer term, these food choices and the repeated exposure to a certain type of diet forms part of the process of socialisation through which children learn the importance of healthy eating, healthy living and investment in physical capital. Parents are able to socialise their children into having preferences for certain foods and into valuing the importance of healthy food choices as a form of capital, to their children. It is presumed that the control of this process of socialisation is largely contingent on continuous monitoring and supervision of children's eating. Thus, it can be hypothesised that parents who have a strong desire to control children's social learning of food tastes and preferences are more keen on having joint family meals where children's eating can be systematically supervised.

On the other hand, parents from more disadvantaged groups, may find that the *concern* of eating preventatively for good-health, apart from being financially more difficult to achieve, would also be less likely to make it to the list of priorities which these parents have to deal with on a daily basis. This is not because these parents care less about their children's diet and health, but because their attention is focused on dealing with other more imminent risks to their children's wellbeing. Parents from poorer backgrounds are often concerned about whether children are eating enough, and this may precede concerns of what the long-term consequences *might* be of eating certain unhealthy foods (Backett-Milburn et al., 2006).

Structure and Agency – The Issue of Choice

Differences in dietary habits are not only a result of different socially acquired 'tastes' but also a result of *real* differences in spending power and purchasing choice. Economically disadvantaged groups in society have a *real* reduced choice as far as diet goes, and the financial obstacles involved in maintaining a healthy diet should not be overlooked. The determinants of health-related behaviour are a complex amalgamation of structural context and cultural norms, as well as agency and choice. Giddens explains how people's food choices are a product of conscious choices, and selective attention to evidence about food and health which take place in a field of social, educational and economic constraints and incentives which different groups of individuals experience and interpret differently (Giddens, 1984). He coined the concept of structuration to capture the interplay between agency and structure.

The review of related policy developments in chapter 2 suggested that public health policy addressing the problem of nutrition and health is increasingly relying on information-based initiatives which aim to modify the choices and health behaviours of individuals living in unhealthy food environments. As was discussed above, this may be a reflection of a growing rhetoric of responsibilisation colouring public health policy. Yet, policy which aims to successfully improve the dietary habits of families, should not simply address the 'choice/agency' part of the equation, but could also address the real financial and structural constraints within which families make their dietary choices (Delormier et al., 2009). This point is made eloquently by Gillies in a critical discussion of New Labour family-related policies:

> *"The individualized, agentic self, theorized by Beck and Giddens, and valorised in New Labour policies requires access to middle-class economic, cultural, social and emotional capital, yet is projected as a standard developmental example for all parents to follow. Consequently, a tautology of middle-class success is sustained, with class specific parenting practices and values used to account for the inequality they reflect. This faulty logic drives an almost missionary zeal to shape the poor into ideal citizens, as is evident in the moralistic and often authoritarian subtext of current initiatives to 'support' socially excluded families"* (Gillies, 2005:850).

Gillies' critique can be applied to the current national and international child nutrition policy portfolio. The current reliance on information-based policy initiatives fails to recognise the lack of resources and structural constraints which often make the individual *choice* to breastfeed or eat healthy food unfeasible (Wall, 2001). The underlying presumption of information-based initiatives is that if parents, and particularly mothers, where fully aware of the benefits of breastfeeding, delayed weaning and healthy eating, they would make the right *choices*. However, as Carter stresses, "*the idea of 'choice' ignores the mechanisms of control and lack of resources which limit, rather than expand, women's choice in relation to feeding*" (Carter, 1995:234). The current breastfeeding recommendations also ignore how other government policies can constrain real free choice with regard to infant feeding by placing contradicting demands on mothers and families. The current lack of co-ordination in the recommendations of infant feeding and exclusive breastfeeding targets on the one hand, and the maternity leave and maternity pay guaranteed to mothers on the other hand, is an example of this phenomenon. The nature of the multilevel governance framework in which Scotland operates does not facilitate policy co-ordination, seeing as public health policy is a devolved issue while maternity leave and pay remain within the remit of UK state policy.

Health policy initiatives assume that human beings are overwhelmed with choice, more so in modern society than ever before. If that were the case, it would be difficult to explain why some people would *choose* to eat foods which can result in type II diabetes, obesity and general ill-health while being fully aware of the implications of their actions. However, parents on lower incomes do not always have the *choice* to opt for healthy diets. In some occasions, choosing healthy alternatives may come at the cost of curtailing spending on other commodities or necessities, such as heating or electricity (Dobson et al., 1994; Dowler et al., 2001).

Rather than pointing to an 'ignorance' of health issues, unhealthy food choices can also be understood as a process by which individuals 'actively ignore' official recommendations on what people should or should not eat. The process of actively 'ignoring' advice has been well illustrated with the example of 'Uncle Norman' (Davison, 1989) which has been further developed by Caplan (1994). As Caplan states: *"'Uncle Norman' is anybody's aged friend, acquaintance or relative, who drinks like a fish, smokes heavily, eats a diet of chips and cream cakes and yet remains perfectly healthy into advanced old age"* (1994:27). Every person is likely to have an example of such a person to relate to, and as people have to deal with conflicting sources of information and knowledge, one 'Uncle Norman' may easily invalidate all medical evidence and policy advice. In a risk-plagued society, choosing to contest the policy and media driven propaganda on diet can be seen as a form of *choice*, and perhaps even a form of resistance, rather than ignorance.

A Guide for Enquiry: Key Research Questions

A series of key concepts from social theory have been presented and these will be used to understand how maternal decisions about feeding are made and how children's eating habits develop over time. Building on the above theoretical pillars, as well as the empirical research literature and policy developments reviewed in Chapters 1 and 2 respectively, this final section outlines five research questions which guide the enquiry of this doctoral research. A brief discussion of how concepts covered in these research questions may be operationalised also features below.

Q.1 Do parents with more human capital help to cultivate physical capital in their children by making healthy nutrition choices?

Theories of 'human capital' point to the interrelationship between such capital and health, whether health is understood as a component of human capital (Becker, 1993) or as physical capital produced following the accumulation of social, economic and cultural capital (Bourdieu, 1984). Human capital, can be understood as the key active ingredient of different micro-cultures which result in different learned dispositions which colour the way individuals perceive their world and act within it. Among other things, Bourdieu argued how cultural capital explained differences in *tastes*, including tastes for food (Bourdieu, 1984), and that higher capital is linked to a desire to pursue healthy lifestyles and healthy diets (Bourdieu and Passeron, 1977).

These concepts have been developed to look at the human capital in adult individuals. This fails to account for how social and primarily physical capital is developed in children. Becker primarily speaks of children as recipients of human capital following direct maternal investments in the production of this capital in children. As for the acquisition of physical capital and health, Bourdieu argues that physical capital *cannot* be directly inherited but must be cultivated through appropriate choices and behaviours. It is hypothesised that the production of physical capital in children is driven by parents *on children's behalf*. Parents transform their own human capital into physical capital in children by making health-preventative choices for them with regard to infant-feeding and food choices. But these ideas frame children in a passive light and maybe do not reflect the ways in which children assimilate parental human capital, and actively engage in producing such human and physical capital for themselves.

The first research question builds on these ideas and seeks to explore how parental, and primarily maternal, human capital shapes children's health and physical capital via parental choices on food and feeding. The operationalisation of these ideas identifies children's nutritional outcomes as dependent variables, and indicators of parental, and particularly maternal, human capital as key independent variables.

Household income and maternal occupational classification are two of the indicators which can capture the latent concept of human capital. More importantly, maternal education will also be used as an indicator of human capital, reflecting the central importance which Becker associated with formal educational in his human capital theory. Further details on the operationalisation of these concepts are covered in chapter 4, and the analysis based on this research question is presented in chapter 5.

Q.2 Does maternal human capital explain differences in maternal attitudes towards the involvement of health professionals in aspects of childrearing and child nutrition?

Building on the stated importance of human capital in influencing the health outcomes of adults and children, this second research question looks into greater depth at how human capital affects how individuals perceive and respond to a heightened fear of *risk* associated with child nutrition and health. Various scholars have argued that a heightened sense of *risk* has coloured the way we perceive the world around us paving the way for an increased involvement of medical professionals in regulating and monitoring child nutrition and health (Blum, 1993; Fildes, 1986; Maher, 1992b; Mennell et al., 1992; Murphey, 2000; Stainton Rogers, 2001).

However, different social groups perceive health risks in different ways, and they may respond to an increased involvement of medical professionals in childrearing in different ways. This may be affected by the extent to which parents feel pressured to take *responsibility* for their own and their children's health outcomes (Garland, 1996). Human capital in turn largely determines maternal attitudes to the intervention of health professionals in aspects of childrearing, and parents with more human capital are more likely to value and welcome such intervention (Bourdieu and Passeron, 1977). Ultimately, it is as a result of their human capital that parents come to value and legitimate medical knowledge, and by using this knowledge they hope to find themselves *empowered* to make appropriate and *responsible* nutritional choices for their children (Foucault, 1980). However, medical knowledge is not the only source of knowledge informing the decisions of parents, and many parents may choose to 'actively ignore' official public health advice in favour of more experiential sources of advice (Caplan, 1994; Davison, 1989). It is hypothesised that human capital in itself may influence what forms of knowledge parents are more likely to rely on in making food and feeding decisions.

Research question 2 draws on the above ideas and explores to what extent maternal human capital explains differences in maternal use of formal and informal sources of advice on infant and child nutrition. Formal sources of advice are defined as advice claiming to be based on empirical evidence usually provided by medical professionals. Informal advice is a broad term to refer to all other non-evidence based forms of advice, with particular reference to experiential advice offered to parents by their immediate family members and friends. The operationalisation of these ideas relied primarily on using the above mentioned three indicators of maternal human capital as independent variables to explain a) maternal attitudes towards and maternal use of advice on healthy eating and childrearing from formal sources of advice, and b) maternal use of advice from informal sources, including family, friends and other mothers. More details regarding the operationalisation of the above concepts are covered in chapter 4 and the analysis resulting from this research question is presented in chapter 6.

Q.3 How does maternal knowledge of, and use of, nutrition advice relate to infants' and toddlers' diets?

The third research question is primarily concerned with evaluating whether there is sufficient evidence to justify an increased reliance within public health policy on using information-based initiatives to promote healthier eating in the population. It has been argued in the review of related policy developments that public health initiatives tend to assume that poor nutritional habits result from a lack of awareness in the population regarding what constitutes a healthy diet. Thus, by *educating* individuals and parents about the risks associated with certain diets, parents ought to be able to *choose* healthier options for themselves and their family (Carter, 1995). It is through the acquisition of knowledge on issues related to food and health, that individuals can be empowered to choose a healthy diet and healthy lifestyle (Foucault, 1980).

But as the preceding research question hypothesises, and as the review of empirical research literature suggested, parents use a variety of sources of advice in making decisions about children's nutrition, and advice from health professionals is only one of these sources. Knowledge comes in different forms, and parents have to process competing and at times conflicting sources of 'food knowledge' (Caplan, 1994; Davison et al., 1991). Parents do rely on a mixture of formal and informal advice on eating and the success of information-based initiatives in improving maternal and child health could be compromised in situations where parents are making 'informed' food choices, but not necessarily using the information provided by health professionals. Knowledge does bring power, but ultimately parents are left with the task of evaluating, assessing and choosing between different sources and types of knowledge which informs their subsequent decisions on feeding children.

Research question 3 is based within the above theoretical framework and features extensive attention to policy reflection and evaluation. The operationalisation of these ideas consisted of identifying children's nutritional outcomes as dependent variables using breastfeeding, weaning, and dietary quality at 22 months as indicators of child nutrition. To capture maternal knowledge and use of advice on child nutrition, indicators capturing maternal use of different types of sources of information on breastfeeding and healthy eating, as well as maternal self-reported healthy eating knowledge and cooking skills were used as independent variables. Further details regarding the operationalisation of these concepts can be found in chapter 4, and the analysis and results following from research question 3 are presented in chapter 7.

Q.4 Do children's nutritional trajectories from birth through infancy relate to their tastes for food in the early childhood period?

Q.5 Do children develop a 'taste' for certain diets through their early childhood experiences of family meal rituals*?*

The above two related research questions guide the analysis presented in chapter 8. They aim to understand the extent to which early experiences of nutrition at birth and in infancy predict children's nutritional patterns in toddlerhood and the extent to which eating patterns of the family as a whole explain how children come to develop their nutritional preferences and habits. These research questions address the inadequacy of theories of human capital in explaining the development and social learning of human capital in children from birth through the early years period. Ideas that *tastes* for certain dietary habits are socially learned are traditionally discussed in relation to adults, failing to properly reflect on the ways in which these adults embark on this learning process in childhood (Bourdieu, 1984). More could be done to explain how children come to develop *tastes* for different diets and the importance of communal family meal habits and 'early exposure' in the development of these *tastes.*

Exploring whether the acquisition of *tastes* is based on children's cumulative experiences of and exposure to consistently healthy or consistently unhealthy nutrition could by explored by tracking children's nutritional trajectories from infancy to later childhood, looking at whether early nutritional experiences predict later nutritional preferences. It is hypothesised that parents will consciously or subconsciously aim to 'civilise' their children's bodies by teaching them to assimilate, among other things, maternal eating habits and related *techniques* for the management of a healthy body (Elias, 1982; Mauss, 1973 [1935]; Turner, 1987; Turner, 1992). As such, a predisposition towards 'healthy eating' can be *cultivated* and *nurtured* in children through their families. Parents thus also contribute to the social construction of their children's social identity, partly reflected by children's consumption of certain foods and their participation in family food rituals (Douglas, 1972; Mead, 1949).

The operationalisation of the fourth and fifth research questions involved developing a way to assess if children who had experiences of optimal nutrition at birth and in infancy appeared to develop a preference for healthier foods in early childhood, while controlling for other factors of the family and child known to affect children's food choices. This entailed using children's breastfeeding experiences to predict their experience of weaning, and then using children's experiences of breastfeeding and weaning to predict their dietary quality as toddlers. For the fifth research question a series of contextual variables describing how and when children ate their main meal, were used as independent variables to capture the relationship between family meal rituals and children's dietary quality. Further details on the operationalisation of these concepts can be found in chapter 4.

Next Chapter

The above five research questions set the agenda for the research undertaken for this thesis. These draw on the theoretical concepts discussed in this chapter, reflecting on theories of social constructionism, risk, responsibilisation and medicalisation, human capital, as well as structure and agency, with regard to how children's nutritional habits develop. The research questions are based in social theory, and they address issues which would traditionally be researched through more qualitative and ethnographic methods of enquiry which may be better suited for constructing theoretical narratives. The extent to which it is possible to contribute to, or challenge theoretical, concepts about eating and the body through 'hard' quantitative data is an issue of key concern. It is unclear to what extent this is generally methodologically possible, and it remains to be seen to what extent this will be achieved in this thesis.

The following chapter provides a comprehensive outline of the methodology and statistical methods used for the analysis carried out for this thesis. The chapter will also set out the underlying theoretical principles of the quantitative method, and explain the nature of the data and the statistical techniques involved in the analysis. It also provides a detailed explanation of how the questions and concepts underpinning this research were operationalised, and how variables available in the GUS survey were selected and derived to fit the aims of the research enquiry.

CHAPTER 4
Methods and Methodology

Introduction

This chapter commences with some key methodological reflection pertinent to quantitative research, and subsequently lays out a comprehensive overview of the Growing Up in Scotland survey, which provided the key source of data for this research. This is followed by a review of other existing quantitative sources of data on infant and child nutrition and a discussion about why the Growing Up in Scotland survey is an appropriate source of data for this doctoral research. Finally, the last part of the chapter discusses how the key concepts captured by the five research questions and theoretical concepts introduced in chapter 3 were operationalised using the data available.

Methodology

As a chosen methodology, the validity of secondary analysis rests on a set of assumptions associated with positivist research, such as random sampling, data reduction and statistical inference. It is assumed that questions measuring or capturing a characteristic or phenomenon may be substantively meaningful if such questions are able to capture and operationalise an underlying concept of interest (De Vaus, 2002; Skinner, 2000). The adoption of such methodology has been formed at the backdrop of a positivist theoretical approach to social research. The underlying epistemology is one of objectivism which assumes that the social world can be impartially understood through systematic standardised measurements which can capture and quantify social phenomena (Crotty, 1998). Thus, the validation of secondary analysis rests on the validation of the broader ontology of objectivism and the positivist approach to explaining the social world.

Quantitative Longitudinal Analysis

Quantitative longitudinal analysis draws on repeated observations of a phenomenon over time. In social research it is usually used for the analysis of *change* and *development* and the analysis of *durations* or *time* spent in a certain state. (Menard, 2002). There are several data sources which can be used to conduct longitudinal analysis, and one of the more common ones is to use repeated cross-sectional studies which use observations from different cases at different time points to look at changes in aggregate trends, for example changes in population attitudes over time (Ruspini, 2002). Cross-sectional studies are popular because they are relatively cheaper to run than panel or cohort studies, and they are less affected by attrition problems associated with panel and cohort studies. However, cross-sectional data is less capable of determining causality, and it does not support the analysis of duration of events. Also, unlike panel and cohort data, cross sectional data cannot be used to control for residual heterogeneity. Panel and cohort studies, on the other hand, rely primarily on data collected from the same cases over time, and thus allow for the analysis of change within individuals over time. Panel and cohort datasets are necessary for the analysis of life histories of individuals, of changes occurring during a life course, and of durations spent in different ‘states’ during this life course. Panel studies rely on a set number of respondents for whom data is collected over time, while cohort studies aim to observe the development of a particular group selected to have one of their characteristics linked to the same point in time (Baltagi, 2001).

The survey design in panel and cohort surveys can be prospective, that is collecting information on events as they occur, retrospective – collecting recall information of events that have already occurred, or mixed retrospective and prospective, such as the Growing Up in Scotland survey used for the analysis in this thesis (Menard, 2002). Prospective designs are generally more accurate since they are less likely to suffer from recall bias, but these are also typically more expensive and may require considerably longer study periods depending on the research topic in question. Retrospective designs are cheaper, and can produce data for very long periods of time with fewer survey sweeps, but issues of recall bias may compromise the validity of the data. This is particularly the case when recall regards events which have occurred several years prior to interview, or in research questions regarding respondent attitudes, emotions or decisions dating back in time (Baltagi, 2001).

Nevertheless, longitudinal analysis using panel or cohort data are better able to address some of the weaknesses of simple cross-sectional analytical designs. In theory, panel and cohort data could be used to distinguish between the effects of ageing over time, the effects of being part of a particular cohort or generation in time, and the effects that living during a certain period, e.g. an economic crisis, have on individual outcomes (Hagenaars, 1990). However, it is worth noting that in practice, it may still be difficult to disentangle age, cohort and period effects from each other even when using panel and cohort data. Compared to cross-sectional data, longitudinal data may be better able to reveal the direction of causality of events, such as whether ill health causes unemployment or whether unemployment causes ill health. Also, longitudinal data is better able to account for state dependence of cases in the analysis, and how previous behaviour affects subsequent behaviour. Finally, longitudinal analysis can allow for the control of residual heterogeneity, where variation in the outcomes of similar individuals is affected by unmeasured on unmeasureable variables (Menard, 2002).

Introducing the Growing up in Scotland Survey

This thesis relies primarily on the analysis of the Growing Up in Scotland (GUS) longitudinal cohort study. GUS is a rich and representative cohort study launched in 2004 which is carried out by the Scottish Centre for Social Research (ScotCen) and funded by the Scottish Government Education Department. It focuses primarily on babies' and young children's growth and development within the context of family life, and covers a range of topics spanning from child nutrition and health to grandparental contact with children and parental use of childcare. It is unique due to being designed to focus intensively on Scottish policy and thus allows for policy relevant analyses to be carried out. It is also unique in that it follows children from the age of 10 months on an annual basis, and can therefore provide valuable insight into children's development during the very early years. This is a period in children's lives on which little quantitative data exist to date.

While the GUS survey is growing to become a very valuable source of longitudinal data on children's development from birth through the early years period, the analysis in this thesis used only the first three sweeps of the survey which were available at the time of analysis. Given the nature of the data contained in these three sweeps, and the absence of repeated measures during this period, more elaborate methods of longitudinal analysis could not yet be used. Such methods will be applicable when further sweeps of the data become available with more instances of repeated measures between sweeps. In light of the above, most of the analytical models in this thesis were longitudinal in the sense that they controlled for predictors which preceded the outcome variable in time, while other analytical models simply drew on cross-sectional data from one sweep. Breastfeeding duration was analysed by means of survival analysis, although the data on breastfeeding duration was collected retrospectively, and could potentially have been affected by recall bias. Further caveats of the data and variables used in this thesis are discussed later in this chapter.

GUS Survey Design

Sampling

The official user guide for the first sweep of GUS (Corbett et al., 2007) describes the survey design in great detail, and a more contained overview is provided in this chapter. The GUS survey relies on the Child Benefit Register as its sampling frame, administered by the Department of Work and Pensions (DWP) on behalf of the HM Revenue and Customs (previously Inland Revenue). The register includes 97% of all eligible children, but excludes children without UK residency and children subject to immigration control (www.hmrc.gov.uk/childbenefit/index.htm). Once obtained, the sampling frame was stratified by aggregated Data Zones (6505 geographical units created by the Scottish Government for reporting 2001 Census small area statistics). The Data Zones were subsequently sorted by Local Authority and by the Scottish Index of Multiple Deprivation score. From this hierarchically sorted list, 130 areas were selected following a stratified random selection process (Anderson et al., 2007:195).

GUS was initially designed to follow two separate cohorts through annual survey sweeps. In total 12,930 children were sampled by date of birth, by the DWP from the 130 randomly selected data zones. Sampling occurred on a monthly basis and the selection dates spanned from June 2004 to May 2005 for the baby cohort, and June 2002 to May 2003 for the toddler cohort. This ensured that the sample catered for any confounding seasonal effects. The children's families were first contacted by the DWP and unless they explicitly refused to participate in the study, their details were given to ScotCen.

Of all eligible children, 1,621 were removed by the DWP. Some of these were removed for being in 'sensitive' circumstances, but most were removed for having already been sampled for research within the previous 3 years (Anderson et al., 200:195). Of the remaining 11,309 children, a further 1,166 were deemed 'out of scope', usually because the addresses were incorrect or the children were ineligible. Where two sampled children lived in the same household, one was selected at random. Twins had equal chances for selection, but with two eligible children in the same household from different cohorts, the baby had higher odds of selection to ensure the ratio of babies to children was maintained (Anderson et al., 2007:195). From the final 10,143 'in-scope' sample, 80% of families agreed to participate in the study (62% of all eligible children), an exceptionally high response rate, giving a final sample of 8075 children. Of these children, the baby cohort consists of 5217 babies who were about 10 months old at the time of the first interview. The toddler cohort consists of 2858 toddlers who were about 34 months old at the first interview.

Data Collection

Interviews were carried out in the homes of the participants using Computer Assisted Personal Interviewing (CAPI) which is known for better item response rates and more accurate data than the Paper and Pencil Interviewing (PAPI) methods used in some other surveys (De Vaus, 2002:123). They mostly contained closed questions and included a self-completion section. The main carer of the sample child was interviewed and this was predominantly (99% of cases) the mother of the sample child. After the first sweep, modules which also interviewed the sample child's partner directly were included in the survey, and other modules asked the main respondent about the involvement of grandparents in the child's life. However, given that the data are primarily capturing maternal practices, attitudes, beliefs and behaviours, this thesis will primarily refer to the influence of *mothers* on children's diets, to reflect the data collected on child feeding through the survey, and the habits of most families living in Scotland.

GUS is a source of cross-sectional, time-specific and time-series, and longitudinal cohort data. The 6th annual sweep has recently been completed and data collection for the 7th sweep is underway at the time of writing. The first 3 sweeps of the data were used for the analysis in this thesis, as sweeps 5 and 6 had not yet been completed to be included in the study, and sweep 4 which had been completed did not contain any data relevant for this research. At the third sweep, the baby cohort was just under 3 years of age, and the toddler cohort just under 5 years of age. The Scottish Government has agreed to fund the continued annual surveying of the baby cohort until 2012 (with a data collection break in 2011). This will enable longitudinal analysis of the children's development from infancy to childhood. The toddler cohort was followed for 4 sweeps, until the toddlers reached the age of six. Meanwhile, a new baby cohort will be introduced in 2011 which will enable comparisons between babies born in 2011 and those born in 2004-2005. An outline of the data collection schedule for each cohort can be found in Table 1.

Table 1 GUS Survey outline – Baby Cohort (BC) and Toddler Cohort (TC)

	AGE AT INTERVIEW							
Year	**10 months**	**Under 2 years**	**Under 3 years**	**Under 4 years**	**Under 5 years**	**Under 6 years**	**Under 7 years**	**Under 8 years**
2005	BC1		TC1					
2006		BC1		TC1				
2007			BC1		TC1			
2008				BC1		TC1		
2009					BC1		-	
2010						BC1		-
2011	BC2						-	
2012		-						BC1

Source: Table reproduced with permission from ScotCen data workshop handouts

Attrition and Non-response

As with any longitudinal survey, cumulative non-response can evolve into a real problem over time. While GUS has a relatively low rate of attrition, this is still an issue of concern for the validity of GUS. Table 2 outlines the number of cases achieved for each sweep for each cohort, the proportion of achieved interviews as a percentage of those interviews that could be achieved at each sweep for eligible respondents not removed by the DWP, and the final column shows sample attrition and represents the number of interviews with cases achieved at a particular sweep as a proportion of all those cases achieved at sweep 1. Thus, by sweep three, about 20% and 18% of families in the baby and toddler cohorts had been 'lost' from the survey.

There are two main problems with attrition. Firstly, the sample size is reduced and this affects the level of precision with which estimates can be achieved. Second, as non-response is higher among certain more disadvantaged sub-groups of the population, the sample becomes progressively less similar to the population it is supposed to represent. An analysis of non-response conducted by ScotCen indicated that, as is usually the case for most other surveys, groups more likely not to respond were: lower income families, lone parents, families living in more deprived areas, mothers who had not breastfed, parents who did not attend parent and child groups and younger mothers. Clearly, different groups of respondents differ in their lifestyles, eating habits and food consumption, and GUS data will become increasingly more biased towards the groups which were more likely to respond (Corbett et al., 2007).

Table 2 GUS attrition rates

	No. cases achieved	Response rate	As % of sw1 achieved
Birth cohort			
Sweep 1	5217	80%	100%
Sweep 2	4512	88%	86%
Sweep 3	4193	90%	80%
Child cohort			
Sweep 1	2859	79%	100%
Sweep 2	2500	89%	87%
Sweep 3	2332	90%	82%

1.Source: Table reproduced with permission from ScotCen data workshop handouts
2.Response is calculated as a proportion of cases 'in scope'; deadwood and incorrect addresses have been removed from the base
3.Ineligible or 'deadwood' include deaths, emigrants, demolished or vacant addresses. Unknown eligibility include untraced movers. Unproductive include non-contacts, refusals and other non-response (e.g. broken appointments)

Table 3 provides an indication of the nature and extent of survey non-response by indicators of parental socio-economic and educational status. The table shows that overall, 14% of the respondents who participated at sweep one had not responded in sweep 2, and 20% had not responded at sweep 3. However, some groups of families were more likely to drop out of the survey than others. Among mothers with no qualifications, 1 in 4 had not responded at sweep two, and 1 in 3 had not responded in sweep three. The total and cumulative non-response for mothers with higher level qualifications was much smaller, at 11% in sweep 2 and 16% in sweep 3.

Table 3 Survey non-response for GUS sweeps 2 and 3 by family characteristics

	Proportion of sample not productive at SW2		Proportion of sample not productive at SW3[1]	
	%	N	%	N
Total non productive	13.5	(705)	19.6	(1024)
Highest educational level of respondent				
Higher or above	10.6	(398)	15.6	(585)
Standard grade or other	18.8	(184)	27.4	(268)
No qualifications	25.3	(119)	34.6	(163)
NS-SEC of respondent				
Managerial and professional occupations	8.3	(156)	12.4	(234)
Intermediate occupations	11.6	(116)	17	(170)
Small employers and own account workers	9.6	(20)	12.5	(26)
Lower supervisory and technical occupations	17.7	(56)	25.2	(80)
Semi-routine and routine occupations	18.7	(289)	26.7	(414)
Never worked	25.2	(62)	38.2	(94)
Household Income				
1st quartile - up to £14999 per year	20	(271)	29.9	(404)
2nd quartile - from £15000 to £25999 per year	12.4	(146)	17.2	(203)
3rd quartile - from £26000 to £43999	9.2	(120)	13.9	(181)
4th quartile - £44,000 and above	7.7	(66)	11.7	(100)
Missing income data	19.1	(102)	25.4	(136)

Source: Table produced using sweeps 1,2,3 of GUS data

Note 1: Denominator is SW1 data

A similar stratification in the pattern of non-response can be seen for maternal occupational classification (NS-SEC), and for household income. These results show that survey non-response is biased towards families from disadvantaged backgrounds. The extent of this bias grows with every subsequent survey sweep, and the cumulative effect of bias non-response results in a remaining sample at sweep three which needs considerable adjustment in order to resemble the population from which it has been drawn. This is a caveat of any longitudinal survey. In fact, similar trends in non-response were observed with the Millennium Cohort Study (MCS), raising issues about the validity of inferences made from the data (Hansen, 2008). Further information on GUS non-response can be found in the official data user guide (Corbett et al., 2009).

Survey Weights

The complexities inherent to the sampling design of the survey, along with the challenges of cumulative attrition over time, combined with survey and item non-response mean that analysis and interpretation of GUS data can be challenging to carry out. Therefore, the survey weights provided with GUS data are essential if the analysis is to enable inferences to be made about the population it represents.

The survey weights aim to correct for attrition and non-response bias, and they also account for the different probability of selection for some of the children and the stratified sampling procedure employed for GUS. As non-response has a cumulative effect over the years, each annual sweep also comes with the appropriate survey weights. Weights aim to make the achieved sample resemble the originally issued sample. In practice, applying weights results in down-scaling the input of respondents who are more likely to respond, and this results in a further reduction of the sample size which again affects the precision of the estimates and adjusted standard errors (Anderson et al., 2007:197).

Ultimately, while weights are important tools for the analysis of complex survey data, they are unable to provide an insight into the behaviours and attitudes of those families who never participated in the survey in the first place. As these tend to be families living in the most disadvantaged circumstances, the GUS dataset, as well as other similar forms of data, may fail to capture the true range in nutritional habits and health behaviours of families and children living in Scotland. This may disguise the true extent of nutritional poverty and health inequalities among disadvantaged families, which has been documented in previous qualitative studies (Dobson et al., 1994; Dowler and Calvert, 1995; Dowler et al., 2001).

Missing Data and Imputation

The problem of cumulative non-response in GUS meant that a number of key variables of interest, particularly at sweeps 3 had a smaller than planned number of valid responses. As discussed, non-response poses a real problem for analysis, both because of the overall impact these variables have on sample size during analysis, and because of the implications which item non-response has for the representativeness of the sample and the validity of inferential analysis. As discussed above, survey weights were used to address attrition bias. Complete case analysis was undertaken and cases which had missing data on any of the variables controlled for in multivariate models were filtered out of the analysis. Univariate analysis indicated that item non-response was particularly problematic for the *Income* variable (discussed in page 131), and for BMI (discussed below). Given that the proportion of respondents with missing *Income* data was substantial, list-wise deletion for this variable was considered to be likely to distort the results of the analysis (Howell, 2007). Therefore, a separate response category for 'missing income data' was constructed and included in the model, to avoid losing a large proportion of the sample from the analysis.

A particularly severe problem with item non-response was observed for measures of children's BMI, which were originally to be included in the analysis. Children's BMI was calculated by measuring children's height during the interview, and by obtaining children's weight with interviewer provided weigh scales. When it was not possible to weigh children on their own, the weight of the mother holding the child was obtained, and the weight of the mother alone was subtracted to calculate the child's weight. There was high item non-response for the BMI variable, and 18% of all toddlers still participating in sweep 4 had missing BMI data at either sweep 2 and/or sweep 4, meaning that one fifth of the achieved sweep 4 sample could not be used to analyse change in BMI from sweep 2 to sweep 4. In light of this problem, different imputation techniques were explored to enable the imputation of missing BMI values for children. However, given the scope of the PhD and given the limited time available, these aspirations have been postponed for the time being and may be pursued through postdoctoral research.

Comparing GUS to Other Data on Child Nutrition

It is appropriate, prior to describing the variables and methods used with GUS, to review what other sources of data are available which could have posed as feasible alternative data sources for this doctoral research.

Millennium Cohort Study

GUS was broadly inspired by the UK Millennium Cohort Study (MCS) launched in 2000. The first sweep of the MCS ran during 2001-2002 and the parents of 18,819 babies were interviewed when the babies were approximately 9 months old, and the parents are interviewed again when the children turn 3, 5, 7 and 11 years old. The survey cohort comprises of four sub-samples in the four nations in the UK: England (starting sample of N:11695), Wales (N:2799), Scotland (N:2370), and Northern Ireland (N:1955). The Child Benefit records were used and sensitive cases were excluded by the Department of Work and Pensions (DWP) (Dex and Joshi, 2004). Geographical stratification of the sample allows for adequate representation of the four different nations of the UK. The MCS also over-represented areas in England identified in 1991 as having larger populations of ethnic minorities, and areas with a high incidence of child poverty. Sampling relied on electoral wards and on the Index of Deprivation 2000 (Dex and Joshi, 2004:10). The response rate, better for the MCS than for GUS, was 68%, which was 82% of the in-scope sample. Even looking exclusively at the Scottish response rate, MCS was slightly more successful than GUS, at 70%, and 85% for the in-scope sample (Plewis, 2004). Further details on GUS response rates have been outlined in Table 2 on page 108.

A comparison of the GUS and MCS can point to the relative drawbacks and benefits of GUS as the data source for this research. While both surveys are longitudinal, the MCS does not interview sampled children on an annual basis, and as the second sweep runs when children are already 3, and the third when children are aged 5. There is a vast range of information about children's development during these early years which the MCS does not capture. In comparison, GUS is intensely focused on the early years period and the transition into childhood and the sweeps at yearly intervals aim to capture these developments. Overall, GUS, with its annual snapshots, is better suited to explore infants' nutritional trajectories from birth through to the early years and better able to monitor the gradual developments and transitions occurring from infancy to early childhood.

Furthermore, both the MCS and GUS are ‘policy-sensitive’ surveys and are designed to enable analyses which can inform, and to some extent evaluate, social policy initiatives. One of the primary objectives for the MCS was to allow for a national evaluation of Sure Start policy initiatives (Smith and Joshi, 2002:30). In part this is also the objective of the GUS questionnaire, as it also asks about the use of and access to Sure Start Scotland schemes. However, GUS also enquires about *ParentLine Scotland*, the *Childcare Link* website and phone-line, *Children’s Traffic Club*, the *NHS 24* phone line and asks about the mother’s use of the *Getting Off to a Good Start* leaflet on breastfeeding. GUS is thus unique as it enables the evaluation of a range of policy initiatives and services aimed at parents and families and allows for the analysis of how access to these services differs *within* Scotland.

With regard to child nutrition, the MCS measures the incidence of *exclusive* breastfeeding duration in sweep 1 and enquires about child nutrition at the second sweep when children are 3 years old. By measuring exclusive breastfeeding MCS is a suitable tool for comparing performance to the breastfeeding targets set out by the WHO, and the Department of Health for England and Wales. On the other hand, GUS measures *complementary* breastfeeding duration, not distinguishing between mothers who combine bottle- and breastfeeding. This is because the GUS questionnaire was designed when the Scottish breastfeeding targets (unlike those in England and Wales) related to complementary, rather than exclusive breastfeeding. As the Scottish breastfeeding targets have now been harmonised to those of the UK for the new birth cohort to be introduced in 2012, exclusive breastfeeding will be measured for the new GUS baby cohort to be launched in 2011.

As is evident, the initial Scottish sample in MCS is considerably smaller than the two samples in GUS, and the MCS only follows one cohort of children. On the other hand, the MCS would offer the benefit of enabling intra-UK comparisons with respect to children’s nutritional habits, which cannot be carried out with GUS. Also, given the higher proportion of ethnic minorities living in England, combined with a sample design with over-sampled for these minorities, the MCS can provide useful information on the diets of children from different ethnic minorities. GUS, however, has not over-sampled for ethnic minorities because the overall small size of these minorities in Scotland rendered specific sampling for them unfeasible.

Infant Feeding Survey

The most comprehensive data on infant feeding for the UK come from the *Infant Feeding Survey* (IFS). It is a survey conducted at five-yearly intervals since 1975. The survey offers valuable data on breastfeeding, (exclusive breastfeeding since 2005) and on mothers' opinions about breastfeeding in public. However, the survey is only designed to monitor breastfeeding, and does not go on to survey children's eating habits as they grow older. As such, it is not able to support the analysis plan for this doctoral research. Nevertheless, this thesis does include some analysis on breastfeeding duration where GUS breastfeeding results are compared with the IFS 2005 data as a means for cross-validating findings (Hakim, 1982). Therefore, a brief overview of the survey design is provided here.

The IFS collects three sweeps of data, by self-completion postal questionnaires, when the baby is 6-10 weeks, 4 to 5 months, and 8 to 9 months of age (Bolling, 2006:3). Initially, 19,848 mothers of babies born within a six week period from August to October 2005 were contacted for the IFS 2005. To enable between-nation comparison, births in Scotland, Northern Ireland and Wales were over-sampled. Questionnaires were returned by 12,290 mothers, although response rates were highest for Scotland at 66% and 65% for Wales, 62% in England, and 59% in Northern Ireland. The IFS enquires about the mother's occupational classification, age she completed her full-time education, smoking habits, her age, and the child's birth-order (Bolling, 2006).

Low Income Diet and Nutrition Survey

If focusing on more nutrition-specific surveys, the Low Income Diet and Nutrition Survey (LIDNS) is an interesting data source. The LIDNS was commissioned by the Food Standards Agency specifically to survey the eating habits and health of the poorer and more disadvantaged groups of the population in the UK (Nelson et al., 2007). It has a total sample of 3,728 people, selected to represent the bottom 15% of the population in terms of material deprivation. The survey oversampled for Scotland, and included children aged 2 years or older and adults. Unlike GUS, the LIDNS collected four 24-hour recalls on random days (including one weekend day) within a 10-day period. It also recorded physical measurements, and blood pressure, as well as a blood sample from those aged 8 years and over to assess nutritional condition.

LIDNS is very different to GUS in several respects. Firstly, LIDNS is not a survey of children, and only children aged 2 or over are included, while blood-samples are only collected of those aged 8 or over. As such, it does not fully capture the early years period which this doctoral research intends to focus on. More importantly, it is a cross-sectional, rather than a longitudinal survey, and cannot help explain how children's eating habits evolve from birth to later childhood. By focusing on lower-income groups, rather than on the whole population, the LIDNS cannot enable an analysis of how eating habits vary between different groups in society. Also, the Scottish sample and overall survey sample is relatively small, which could hamper a multivariate analysis of the data. While it collects more accurate nutritional information than GUS, it does not cover the more social aspects regarding food and meal habits, and cannot provide an image of what the children's eating habits are like and how these develop within the context of family life. For the above reasons the GUS survey is a preferred data source for this doctoral research.

Living Costs and Food Survey

The Living Costs and Food Survey (LCF) is a module in the larger Integrated Household Survey. The module itself was previously known as the Expenditure and Food Survey until 2008 and as the National Food Survey up to 2001. It focuses on the nutritional habits of the UK population but relies on measuring expenditure on food as an indicator of food consumption. It is a continuous survey which can provide information on year on year changes in spending patterns for food in the UK. Data are collected through postal questionnaires, and a diary of all personal expenditure is kept by each adult for two weeks. Children aged 7-15 also participate by filling in their own simplified version of this diary for two weeks (Office for

National Statistics, 2008). While the survey occurs annually, it is not longitudinal like GUS, and does not follow a particular cohort of children or families over time. Therefore, it cannot be used to explain how children's nutritional patterns develop longitudinally. A more important weakness is that the LCF focuses on expenditure, and can therefore say a lot about the collective consumption of food in a family but is less useful when looking at the individual consumption of food for each family member. Finally, the LCF does not focus in any particular way on young children, and is therefore not appropriate for exploring the nutritional habits of babies and toddlers.

The National Diet and Nutrition Survey

The National Diet and Nutrition Survey (NDNS) of children aged one and a half to four and a half years old is a useful resource which has been used in research to explore and understand how children's nutritional habits in early childhood affect later health outcomes. The official NDNS report pointed to the nutritional disadvantage that poorer families and children have and highlighted the link that poor nutrition has to cognitive and physical development in children (Gregory et al., 1995). The survey included weighed dietary records over four consecutive days including Saturday and Sunday, a record of bowel movement over the same four days, physical measurements of the infant, a blood sample and dental examination. However, this survey was carried out between July 1992 and June 1993, and is both outdated and not longitudinal in nature. Furthermore, there is no specific Scottish policy focus in the survey and the Scottish sample constituted of 188 children (Total UK sample N:1675) which would make complex multivariate analysis problematic (Gregory et al., 1995).

ALSPAC

Finally, the recent Avon Longitudinal Study of Parents and Children (ALSPAC) based on the Avon Health Authority on children aged 4 to 7. This study is based on a large sample (N:14,541) of women who were recruited while pregnant between April 1991 and December 1992. The survey aimed to look at environmental and genetic factors which influence children's development and health (Northstone et al., 2005).

Unlike GUS, the study design meant that some information could be collected during the pregnancy, including information about the mother's nutritional habits during this period. The survey followed mothers through birth and interviewed both parents, eventually also collecting data from the children themselves, especially on food and eating habits. ALSPAC data were also linked to administrative health records, and the survey included biological blood samples and clinical assessments. Needless to say that, while the survey in itself is of extraordinary value, the sample represents children from the Avon Health Authority, and could not be used to analyse Scottish eating habits or public policy in Scotland. The results from the survey, however, have contributed to the literature review and informed the development of the analytical plan for this doctoral research.

Operationalisation of Analytical Concepts

Having argued why GUS is the most appropriate survey in addressing the questions at the heart of this research, this section goes on to identify the specific variables of interest which were used to conduct the analysis. GUS was designed to collect information on a broad range of aspects on babies' and toddlers' development over time. Some survey modules are run every year with each sweep while other modules are run biennially or only once in the survey. The module which collects information on nutrition was run in sweep 3 for the toddler cohort and in sweep 2 for the baby cohort and it is primarily these modules, along with information about breastfeeding collected in sweep one, which are of key interest. The operationalisation of key concepts captured within the five research questions underpinning this doctoral research has been by guided by both social theory and empirical research literature while it has also been conducted, where appropriate, with the intention to provide results which can reflect on current Scottish policy recommendations and targets for child nutrition.

The following sections lay out the rationale behind variable selection, and the variable derivations made for the purpose of this thesis. Tables 5-12 provide the original survey variables used and their question wording, and indicate how variables were recoded and derived to produce the variables for the analysis which follows. Tables 5-12 also mark which variables were originally derived by ScotCen and used in their pre-derived form for the analyses. More details regarding variable derivations carried out by ScotCen can be found in the GUS data user guide (Corbett et al., 2007). Frequencies for all variables used for the analysis can be found in Appendix A, in Figure A1 and Tables A1-A8.

Indicators of Children's Nutritional Outcomes

Infant Nutrition

The variables used to derive and produce the indicators for infant nutrition for the analysis in this thesis are described below. Table 5 shows the original and derived variables, along with the variable annotation, used for the analysis in this thesis. An explanation and justification for the variables used and variable derivations carried out for this thesis follows below. In general terms indicators of infant nutrition aimed to reflect on existing child nutrition targets of current Scottish public health policy, and this is particularly the case for the construction of categorical variables on weaning and breastfeeding duration. In the subsequent chapters, eating habits which meet the terms of current policy recommendations will often be collectively referred to as *optimal* eating habits.

Breastfeeding

In the first sweep of GUS the main carer (99% of the time this was the mother) was asked a series of mostly retrospective questions on breastfeeding and was asked to report whether the child was ever breastfed, even if only once. This binary variable (annotated as $InfantNutr_1$) was used in the analysis as an independent variable and will usually be referred to as breastfeeding initiation.

Breastfeeding Duration

The GUS survey also measured complementary, rather than exclusive breastfeeding. As the policy review indicated, current Scottish breastfeeding targets refer to exclusive breastfeeding, but they were only until recently based on complementary breastfeeding. As the GUS questionnaire was designed when the previous targets were in place, the GUS survey only enquired about complementary breastfeeding duration. Rates of complementary breastfeeding will include mothers who breastfed exclusively as well as those who fed their child with a mixture of breast and formula milk. As such, these figures are typically higher than those for exclusive breastfeeding. Table 4 compares data on complementary breastfeeding duration using GUS and 2005 Infant Feeding Survey data to highlight the differences between complementary and exclusive breastfeeding duration.

Table 4 Comparing exclusive and complementary breastfeeding duration rates

(duration in % among all mothers in sample)	GUS[1] Complementary bf	IFS 2005 [2] Complementary bf	IFS 2005 [2] Exclusive bf
	%	%	%
Breastfed initially	60	70	61
At 1 week	52	57	42
4 weeks	45	n/a	25
6 weeks	42	44	19
8 weeks (2 months)	38	n/a	17
17 weeks (4 months)	30	31	6
26 weeks (6 months)	23	24	<0.5

1. Source: table produced using GUS sw1 data, and IFS reported data from Bolling et al (2007).
2. Filtered for single births and biological mothers, weighted data
3. Infant Feeding Survey 2005: Scotland sub-sample

Given that breastfeeding recommendations in Scotland were recently harmonised with those of the WHO and the UK Department of Health, for the new GUS baby cohort to be introduced in 2011, data on exclusive breastfeeding duration will be collected. Not having data on exclusive breastfeeding is clearly a drawback. However, looking at complementary breastfeeding allows for an analysis of duration that includes a larger sample of mothers and a longer overall period of time. This means that a more complex analysis can be carried out and more meaningful results can be obtained regarding the factors which predict prolonged breastfeeding in general terms.

The mothers of the baby cohort who had breastfed, were asked to report how old the child was when it was last breastfed. As the babies were 10 months old at the time of interview, 481 (16%) babies were still being breastfed. The mothers still breastfeeding at the first sweep were asked again in sweep 3 how old the child was when it was last breastfed and a final duration for breastfeeding could be obtained. Mothers provided responses in varying units, i.e. in days, weeks or months. All responses were translated to numbers of days to produce one interval level variable for the analysis of breastfeeding duration, annotated as (*BFduration*), and the analysis of breastfeeding duration was carried out using Proportional Hazards Regression. However, the model was to also control for the relationship between maternity leave and breastfeeding, but maternity leave information was only collected up to the first sweep of data (10 months postpartum). The duration of breastfeeding was therefore censored at 10 months postpartum. It is worth considering that as breastfeeding data was based on maternal recall, it was retrospective in nature and may have suffered from some recall bias. Some mothers recalled the exact number of days they had breastfed, while others reported time in terms of weeks or months, indicating the great variety in maternal recall when regarding breastfeeding duration.

Two categorical variants based on the above two variables for breastfeeding initiation ($InfantNutr_1$) and duration (*BFduration*) were also used in the analysis (See Table 5). One variable annotated as $InfantNutr_2$ distinguished between mothers who breastfed for 6 weeks or more and mothers who breastfed for less than 6 weeks among breastfeeding mothers. This was used as a dependent variable in the analysis presented in chapter 5. The 6-week threshold meant to reflect the existing Scottish Government breastfeeding targets, which although being based on exclusive breastfeeding, aim for an increase in the proportion of mothers breastfeeding at the 6 to 8 weeks postpartum. A second categorical variable annotated as *BFdur* amalgamated information on breastfeeding initiation and duration and distinguished between mothers who never breastfed, those who breastfed for 6 weeks or less, those who breastfed for 6 weeks to 6 months, and those who breastfed for 6 months or longer. This variable meant to also identify which mothers breastfed for 6 months or more, to reflect on current WHO recommendations which promote exclusive breastfeeding for 6 months or longer. *BFdur* was used as an independent variable in the analysis presented in chapter 8.

Weaning

Information on children's weaning patterns was also collected at sweep one for the baby cohort only. Mothers were asked if the baby was regularly eating solid foods at the time of interview (99% of babies were eating solids) and were also asked how old the child was when it was first introduced to solid foods. Based on this information a derived variable was created (*InfantNutr₃*) which distinguished between mothers who had introduced solids before their baby had turned 4 months old, and those who had introduced solids at or after the 4 month threshold (see Table 5). This variable was meant to identify which mothers weaned their babies prematurely onto a solid diet, using a definition of premature weaning based on Scottish Government recommendations (See chapter 2, page 49, for further details). These advise that solid foods should be introduced ideally after the baby turns 6 months old, and not before it turns 4 months.

Table 5 Indicators of infant nutrition

ORIGINAL VARIABLE	Derived	NEW VARIABLE	VARIABLE NAME
Was child ever breastfed? Never breastfed Breastfed			**$InfantNutr_1$**
How old was child when it was last breastfed? Answer in months, weeks, days	→ ✓	**Breastfeeding duration (continuous variable)** [Measured in days]	**BFduration**
	→ ✓	**Breastfeeding duration (banded)** Never breastfed Under 6 weeks 6 weeks – under 6 months 6 months or longer	**BFdur**
	→ ✓	**Breastfeed for 6 weeks (excluding non breastfed children)** Under 6 weeks 6 weeks or longer	**$InfantNutr_2$**
How old was child when it first started solid food? Answer in months, weeks, days	→ ✓	**Weaning** Weaned at or after 4 months Weaned prior to 4 months	**$InfantNutr_3$**

On a methodological note, GUS collected information on the introduction of solids, and it is unclear if this is the definition of weaning used for policy recommendations. Weaning is traditionally understood as the process in which infants start to subsist mainly on a diet of solids, rather than a milk-based diet. But 'introducing' infants to solids could simply refer to the first time infants ever tried a food other than breast or formula milk. Since weaning data were also collected retrospectively, they are also subject to potential recall bias, as has been discussed with regard to breastfeeding. This may particularly be the case. These are caveats of the data which is considered in subsequent analysis and interpretation.

Dietary Quality[1]

As children grew, modules to survey children's eating habits were incorporated into GUS. As the survey is not exclusively about nutrition the food module is meant to provide a general overview of children's food consumption. At the time of survey design and data collection, the official guidelines for feeding children aged 5 or older were based on recommendations of *quantities* of food to eat (e.g. 5-a-day). However, for children under 5 the official recommendations by the Food Standards Agency relied on *frequency* and *variety* of consumption of foods, rather than on *quantity*. To reflect these recommendations, the questions on food consumption for babies and toddlers in GUS focus on *how often* and *how many different* foods children consume, rather than *how much* of these foods they consume. So while the food module in GUS is not suitable for a strict 'nutritional' analysis of children's diet quality, it does provide a good insight of how often children eat different foods and it can give a good indication of whether children have healthy or less healthy eating habits. A detailed overview of the survey questions on eating habits used to derive variables for the analysis can be found in Table 7. A description and justification of the derivation process for each derived variable follows below.

Poorest Dietary Quality Category

Mothers were asked five questions regarding the frequency and variety of foods their children ate. These enquired about the frequency of consumption of vegetables, fruit, sweets/chocolate, crisps, and soft drinks (see Table 7). In order to build a broader picture of children's nutritional habits these variables were transformed and combined into one variable used as an indicator of children's general dietary quality.

[1] Frequencies for all variables used for the analysis can be found in Appendix A, in Tables A1-A8

The responses for each one of the five original variables were assigned a numerical value which reflected the ordinal nature of the original responses on food consumption frequency and variety. An extract of this process is illustrated below:

Consumption of different types of vegetables	**0/day**	**1/day**	**2-3/day**	**4-5/day**	**5+/day**
Numerical value	1	2	3	4	5

How often child eats crisps	**6/day**	**4-5/ day**	**2-3/ day**	**1/day**	**5-6/ week**	**2-4/ week**	**1/week**	**1-3/ month**	**Less often/ Never**
Numerical value	9	8	7	6	5	4	3	2	1

The derived variable combined the numerical information for each of the five questions into one numerical scale. The dietary scale had a theoretical possible range of 5 to 37. A high score indicates a great variety of fruits and vegetables eaten daily, and an infrequent consumption of crisps, sweets and soft drinks. A low score indicates a small variety or no vegetables or fruits eaten, but very frequent consumption of crisps, sweets and soft drinks. Thus, a child would therefore have a score of 5 if it ate zero types of fruits or vegetables but consumed crisps, chocolate and sweets, and soft-drinks 6 times per day. This scale was constructed for each of the two cohorts. However, for the baby cohort the scale captures nutritional patterns at sweep 2 when babies were 22 months old and for the toddler cohort the scale captures nutritional patterns at sweep 3 when toddlers were just under 5 years old.

The histograms in Figures 4 and 5, show the distribution of scores using the derived dietary quality variables for each of the two cohorts. The variables appear to be fairly normally distributed. Crohnbach's alpha values were calculated to assess the internal consistency of each scale (Hair, et al 1998, Nunnally and Bernstein, 2003). A value of $\boldsymbol{\alpha} = 0.7105$ was obtained for the baby cohort scale and a value of $\boldsymbol{\alpha} = 0.6851$ was obtained for the toddler cohort dietary scale. The conventional threshold in the social sciences tends to be at $\boldsymbol{\alpha} > 0.7$, although $\boldsymbol{\alpha} > 0.6$ is sometimes also considered acceptable, particularly for exploratory research (Hair, et al 1998). Factor analysis and was used to assess scale dimensionality, and whether the scales were measuring one underlying construct (Acock 2008). The resulting Eigenvalues indicated that the first factor in each model explained 69.55% of total variance for the baby cohort, and 67.20% for the toddler cohort, thus suggesting that the variables in the scale are undimensional (Acock 2008).

Figure 4 Dietary quality score for baby cohort

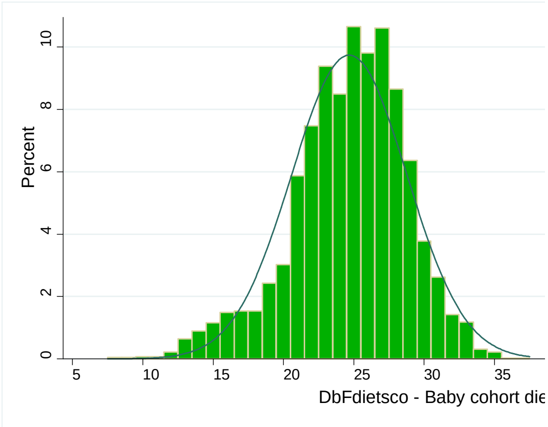
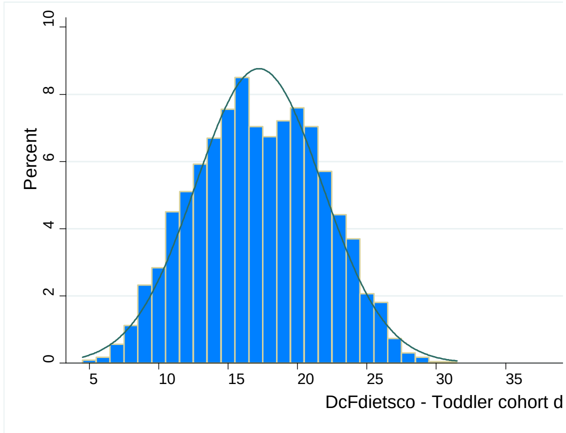


Figure 5 Dietary quality score for toddler cohort



For the baby cohort the median score was 25 with a minimum of 8 and maximum of 37. For the toddler cohort, the median score was 17 with a minimum of 5 and a maximum of 31. As is instantly evident, the baby cohort had an overall higher score at 22 months of age than the toddler cohort at just under 5 years of age using the same data on nutritional habits. It would appear that the overall nutritional habits of the toddler cohort were poorer than for the baby cohort, but a more detailed analysis of these variables follows in chapter 5.

Drawing on the distribution of scores for the baby cohort for the dietary quality variable, the bottom 25% of the distribution were identified as children who were in the bottom quartile on a scale of relative diet quality. This 25th percentile of the distribution fell on point 22 on the scale for the baby cohort, and on point 14 of the scale for the toddler cohort. These scores were use to define the upper threshold which would identify the children in the 'poorest diet category' (see Table 6). These variables, annotated as $DietQual_1$ for the baby cohort and $Diet_1$ for the toddler cohort were two of the variables used for the analysis in this thesis.

Table 6 Derivation and Definition of Poorest Dietary Category variables

	Min	Max	Median	25th centile	Poorest Dietary Category	Derived variables
Dietary Quality (Baby Cohort)	8	37	25	22	Scores 8-22	$DietQual_1$
Dietary Quality (Toddler Cohort)	5	31	17	14	Scores 5-14	$Diet_1$

A limitation with these variables is that they capture *relative* diet quality drawing solely on the dietary habits of children within each cohort. Thus, a relatively poor diet score does not refer to any set official standards of what is defined as a good diet or poor diet. However, given that no such standards currently exist to aid the construction of an objective indicator of diet quality, a relative measure remained the only option for this analysis. It should also be emphasised that as the scale indicates relative diet quality, in theory, even the best diet could still be poor if the whole cohort had a poor diet to start with. However, it is encouraging to see that the distribution of scores was quite normal with most children falling around the middle 50% of the distribution and fewer children around the top and bottom of the scale (Figures 4 and 5).

Vegetable Consumption

While vegetable consumption had been captured in the derived variable measuring dietary quality ($DietQual_1$ and $Diet_1$), it was deemed appropriate to include one indicator of children's dietary quality which focused exclusively on vegetable consumption. This is because vegetables are more likely to be foods which are typically consumed at meal-times and as a food group may require more parental persuasion for children to actually consume, than other foods such as fruit, crisps, sugary drinks and sweets, which might be more likely to be consumed throughout the day, as snacks or during non-specific meal times. A variable was derived indentifying which children ate one or no types of vegetables on a typical day ($DietQual_2$ for the baby cohort and $Diet_2$ for the toddler cohort, see Table 7 for derivation details).

Unhealthy Snacking

In order to capture the frequency with which children snacked on unhealthy foods, three survey questions were combined into one derived variable to capture which children typically ate unhealthy snacks between meals. The derived variable identified which children typically snacked on *at least one* of the following between meals: “crisps”, “cakes or biscuits”, “sweets or chocolate” (annotated as $DietQual_3$ and $Diet_3$ for the baby and toddler cohort). These three categories of snacks were selected for this variable because it was considered that they could be unambiguously defined as ‘unhealthy’ for children. Information was also collected on whether children snacked on “breakfast cereal”, and “bread, toast or similar (e.g crumpets of muffins)”. However, these latter variables were ambiguous, as there are more and less healthy types of breakfast cereal, and there are healthy breads, and unhealthy muffins. Since these variables could not be categorised as unambiguously unhealthy for children they were not used in the analysis.

Variety of Foods Eaten

In the third sweep of GUS, mothers of toddlers were asked to report whether they felt their child ate a variety of foods in general. This question was used to derive a variable which identified which mothers reported that their child was a fussy eater, and therefore did not eat a varied diet (annotated a $Diet_4$).

Table 7 Indicators of children's dietary quality

ORIGINAL VARIABLE	Derived	NEW VARIABLE	VARIABLE NAME (Baby Co.)	VARIABLE NAME (Toddler Co.)
On a typical day, how many different fresh/frozen/tinned fruit does child eat? (0/1/2-3/4-5/5+)	→ ✓	**Poor dietary category** [Based on transformation of categorical responses into numerical scale, see text derivation details]	**DietQual$_1$**	**Diet$_1$**
On a typical day, how many different fresh/frozen/tinned veg does child eat? (0/1/2-3/4-5/5+)	↗			
How often does the child eat: Sweets or chocolate (times per day/per week/per month)	↗			
How often does the child eat: Crisps or other savoury snacks (nuts, crackers, cheese) (times per day/per week/per month)	↗			
How often does the child eat: Drinks soft drinks (excluding lowcal/diet drinks) (times per day/per week/per month)	↗			
On a typical day, how many different fresh/frozen/tinned veg does child eat? (0/1/2-3/4-5/5+)	→ ✓	**If child consumes 0 or 1 types of vegetables on a typical day**	**DietQual$_2$**	**Diet$_2$**
If the child is hungry between meals what does it usually eat?	→ ✓	**If child usually eats unhealthy snacks between meals**	**DietQual$_3$**	**Diet$_3$**
Crisps	↗	[Bases on child eating at least one of following: Crisps/Cakes, biscuits/Sweets or chocolate]		
Cakes, biscuits	↗			
Sweets or chocolate	↗			
Does the child eat a variety of foods? [Eats most things/ eats reasonable variety of things/child is a fussy eater]	→ ✓	**Child does not eat a variety of things** [Based on children reported as being "fussy eaters"]	n/a	**Diet$_4$**

Indicators of Parental Human Capital[2]

The first research question aims to explore the relationships between maternal human capital and children's nutritional outcomes, while the second research question explores the relationship between maternal human capital and maternal use of different sources of advice on child nutrition. Different definitions of human capital have been developed over time, although this thesis relies primarily on the ideas of human capital introduced by Becker (1993) and on the cultural capital discussed by Bourdieu (1984). Bourdieu emphasises the importance of economic and cultural capital, which reflect the financial resources and the knowledge, skills, and education which individuals accumulate over time and a more elaborate discussion of these concepts can be found in chapter 3, page 81. An interesting difference between the work of Becker and Bourdieu is that Becker placed far greater importance on the role of education in shaping overall human capital, and this is a point of particular relevance, subsequently discussed in chapter 5.

A direct measure of human capital cannot be obtained, and as a concept, human capital can be understood as being greater than the sum of its parts. But an analysis of human behaviour can try to control for the effect of human capital by controlling for indicators which capture the distribution of such human capital in society. The analysis in this thesis used household income, maternal educational qualifications, and maternal occupational classification, as the indicators most commonly used to capture the latent variable here defined as human capital (Geyer et al., 2006, Krieger et al., 1997). Collinearity considerations regarding these three indicators have been discussed on page 87. Table 8 summarises the variables derived and used and a description follows below.

GUS collects a vast range of demographic variables on income, education and occupational characteristics. ScotCen who process and deposit the data at the UK Data Archive provide a range of complex derived variables which combine several

[2] Frequencies for all variables used for the analysis can be found in Appendix A, in Tables A1-A8

responses on parental education, occupation and income. Maternal occupational classification (NS-SEC) and maternal education were used in the analysis for this chapter as the mothers reported being responsible for feeding and caring for their children. Also exploratory analysis indicated that in relative terms, paternal NS-SEC and paternal education, where appropriate, were weaker predictors of children's diets.

Table 8 Indicators of maternal human capital

ORIGINAL VARIABLE	Derived	NEW VARIABLE	VARIABLE NAME (Both Cohorts)
Highest Educational Qualification of mother (SW1) †			**Edu**
Degree or equivalent			
Vocational qual/s below degree			
Higher grade or equivalent			
Standard grade or equivalent			
No qualifications			
Highest Educational Qualification of mother (SW2)* †			**Edu2**
Highest Educational Qualification of mother (SW3)* †			**Edu3**
National Statistics Socio Economic Classification of mother (5-fold category) (SW1) †			**NSSEC**
Managerial and professional			
Intermediate			
Small employers and & self-employed			
Lower supervisory and technical			
Semi-routine and routine			
Never worked			
National Statistics Socio-Economic Classification † (SW2)*			**NSSEC2**
National Statistics Socio-Economic Classification † (SW3)*			**NSSEC3**
Annual Household Income – Quartiles (SW1) †	→ ✓	**Annual Household Income – Quartiles (SW1)**	**Income**
Up to £14,999		Up to £14,999	
£15,000 - £25,999		£15,000 - £25,999	
£30,000 – £43,999		£30,000 – £43,999	
£44,000 or more		*£44,000 or more*	
		Missing data	
Annual Household Income – Quartiles (SW2)* †	→ ✓		**Income2**
Annual Household Income – Quartiles (SW3)* †	→ ✓		**Income3**

*Identical variable layout to SW1 version
† Derived by ScotCen

A variable capturing the highest educational qualifications held by mothers is derived from a series of questions regarding qualifications obtained by the mother over time. This was used in its original state to control for maternal education in the analysis (*Edu*). The variable capturing maternal occupational classification is based on the updated National Statistics Socio-Economic Classification (NS-SEC) scheme (Anderson et al., 2007:21). The NS-SEC is calculated using information on the respondent's working conditions, information regarding job security, payments and opportunities for promotion (Rose and O'Reilly, 1998). In GUS NS-SEC was calculated separately for the mother and, where appropriate, the father of the child, and maternal NS-SEC was used in the analysis for this chapter as previously explained. If respondents were unemployed at the time of the interview but had worked previously, NS-SEC was calculated using information on their most recent employment. Different versions of the NS-SEC variable exist, with 8, 5 and 3 bands, and the 5-band classification is used in the analysis (*NSSEC*). The 8-band version, while richer in information, was problematic for statistical computations due to an increased likelihood of empty cells in multivariate regression models.

Finally, a variable capturing total annual household income, banded in quartiles was used for the analysis. Since household income accounted for the incomes of two parents (where this was applicable), it was the only measure which captured information on fathers, in two-parent households. Data on income for sweep 1 was collected at 10 months post-partum during the first interview, when respondents reported their current income at the time. Given the timing during which data on income were collected, the income variable is unable to robustly account for short term variations in pay which mothers may experience in the post-partum period while on partially paid or unpaid maternity leave[3]. As such, the available data on income, particularly for the first sweep of GUS collected at 10 months post-partum, may be unable to capture existing underlying trends in parental behaviours or nutritional choices which are in real life directly or indirectly linked to household income. This is particularly the case when exploring the relationship between income and maternal breastfeeding and weaning decisions. Since income was collected at 10 months post-partum it cannot properly account for how income before birth influenced maternal feeding decisions, and there is a dissonance in the temporal

[3] As confirmed following personal correspondence with Paul Bradshaw at the GUS research team, ScotCen

order of variables. A measure of income prior to birth would have been desirable and more valid.

Issues regarding the validity of the *Income* variable are exacerbated when also considering the high item non-response associated with this variable. Item non-response for household income was at 10.2% in sweep 1, 5.5% in sweep 2, and 6.2% in sweep 3 for the baby cohort, and 7.5% in sweep 3 for the toddler cohort, while full details on item non-response are outlined in Table A4, pages 330-331 in Appendix A. A new response category was added to this variable to account for households with ‘missing income’ data, in order to avoid losing too many cases from the analysis as a result of item non-response for this variable (annotated as *Income*). The subsequent discussion of findings in the chapters which follow will reflect on the problems involved in interpreting results which involved the *Income* variable.

Indicators of Mother and Child Characteristics[4]

Most of the empirical literature reviewed found that children’s gender, birth weight, and birth order, as well as maternal age, maternal ethnicity and whether mothers were lone-parents, were all factors which influenced breastfeeding and dietary outcomes for children, so these variables were controlled for in the analysis. Many of these variables were derived by ScotCen and deposited with GUS data. These include the variable on low birth weight set to reflect the birth weight threshold used by NHS Scotland (low if under 2.5 kilos at birth). Table 9 shows the original and derived variables used to capture the above factors, as well as the variable annotation.

The analysis of the relationship between maternal employment and maternity leave on breastfeeding duration was to be a key component in the analysis of this thesis. Two variables which distinguished between working and non-working mothers, and part- and full-time working mothers were combined into one variable capturing

[4] Frequencies for all variables used for the analysis can be found in Appendix A, in Tables A1-A8

maternal working status during the pregnancy of the sample child (annotated as *Emp*). The survey question on paid and unpaid maternity leave originally reported maternity leave in either days, weeks or months. This information was transformed into days to create one continuous variable. This continuous variable was then banded in monthly intervals with a final interval of those taking 6-10 months leave, and a separate category which accounted for those mothers who were still on leave at the first sweep of the survey, when the child was 10 months old (*Matern*).

At the second sweep, the mothers who were still on leave at sweep 1 were not asked further questions regarding their total leave from work, and so the association between maternity leave and breastfeeding duration could only be examined up to the first sweep of the survey, when the babies are aged 10 months. Seeing as the thesis aimed to include an analysis of maternity leave and breastfeeding duration, only breastfeeding duration spanning from 1 day to 10 months inclusive was used for the analysis, and mothers who breastfed for longer were included in the analysis but censored at 10 months. Data on maternity leave were retrospective, and it is unknown the extent to which recall bias may have jeopardised the validity of this variable. It is assumed that recall may be more problematic for self-employed mothers working from home, for whom maternity leave as a time period might be less clearly defined than for mothers working as employees.

Given the nature of the aforementioned NS-SEC variable, there is clearly some overlap between measures of maternal employment and maternal NS-SEC. However, a key aspect about employment not captured by the NS-SEC variable is whether a mother is working full- or part-time, which in the context of breastfeeding is an important aspect to control for.

Table 9 Indicators of mother and child characteristics

ORIGINAL VARIABLE	Derived		NEW VARIABLE	VARIABLE NAME (Both Cohorts)
Children's gender (Male / Female)				**Sex**
If children were born with a low birth weight (<2.5k) †				**BWeight**
Children's birth order (child's order among siblings) †	→	✓	**If child was first born child**	**Par**
Mother's age at the birth of the sample child (in years) †				**Age**
Mother's ethnic background (White / other) †				**Eth**
Family Composition (Lone parent / Couple household) †				**FamStat**
Mother's Job Type during pregnancy† Self employed Employee **Mother's working schedule**† Part-time Full-time	→ ↗	✓	**Employment status during pregnancy** *Not in work* Full-time, employee Full-time, self-employed Part-time, employee Part-time, self-employed	**Emp**
Length of paid and unpaid maternity leave taken † Responses given in days/weeks/months	→	✓	**Leave from work (paid and unpaid)** *Still on leave at sweep 1* None/up to 1 month Over 1/up to 2 months Over 2/up to 3 months Over 3/up to 4 months Over 4/up to 5 months Over 5/up to 6 months Over 6/up to 10 months	**Matern**

† Derived by ScotCen

Indicators of Knowledge and Use of Nutrition Advice[5]

Healthy Eating Knowledge and Advice

Chapter 6 explores whether maternal human capital explains maternal use of advice on healthy eating and differences in maternal attitudes towards the involvement of health professionals in aspects of childrearing and child nutrition. This section explains how variables were selected and derived to be used as indicators of maternal healthy eating knowledge and use of advice on child nutrition. Variables which could capture how mothers felt about asking health professionals for support, and using what will be termed 'formal' sources of health advice were of particular interest. Analogous attention was given to the use of sources of advice which were not strictly

[5] Frequencies for all variables used for the analysis can be found in Appendix A, in Tables A1-A8

linked to health professionals, such as advice from family or other mothers. These latter forms of advice are collectively referred to as 'informal' advice. Chapter 7 builds upon this analysis and explores how maternal knowledge of healthy eating, and maternal use of different sources of advice on nutrition relate to children's diets in early childhood.

Ideas from social theory regarding the influence that human capital has on the ways individuals perceive *risk*, and on the ways they subsequently respond to an increased involvement of medical professionals in childrearing informed the rationale in identifying indicators of maternal attitudes to and use of 'formal advice' (Beck, 1992). This contrasted to forms of knowledge not actively adhering to public health advice (Caplan, 1994; Davison, 1989) which supported the rationalisation in selecting indicators of informal sources of advice. Further discussion of the theoretical narrative informing this part of the analysis has been covered in chapter 3, page 75.

This distinction between formal and informal advice resembles the distinctions used in similar recently published research (Nicolson, 2010) which contrasts advice from family and advice from health professionals on aspects of childrearing. One characteristic of formal sources of advice, apart from being offered through the health service apparatus, is the claim to be based on empirical evidence. A characteristic of informal sources of advice is that such advice does not necessarily draw on empirical evidence, but may often draw on experiential evidence and personal experiences, as with advice sometimes provided by family members.

General Healthy Eating Knowledge

Three variables were used to capture general knowledge about healthy eating and whether mothers had used any information on healthy eating at all. Among these, the questions on maternal healthy eating knowledge (*HEknow*), and on whether cooking affects children's diets (*Cook*) were recoded to reduce the number of response categories, as shown in Table 10. This was done to improve the performance of these variables in larger multivariate regression models.

Many of these measures (like *Cook* and *HEknow*) are reflexive and based on maternal self-assessment, which is a potential weakness. Furthermore, exploratory analysis of the *Cook* variable indicated that it was unclear whether mothers who responded that cooking knowledge affected children's diets a lot felt this way because they knew 'a lot' about cooking or because they knew 'too little'. This problem was overcome in part by introducing interaction effects in the multivariate regression model between *Cook* and *HEknow* as will be discussed in chapter 7. Fortunately, in subsequent sweeps not used in this thesis, an add-on question was asked which clarified whether it was an abundance or a lack of knowledge which positively or negatively influenced children's diets.

Formal Advice

Three different indicators where used to capture maternal attitudes towards, and use of, advice from health professionals (see Table 10). One survey question asked whether mothers had used advice from health professionals, defined as either GPs, midwives or health visitors and this was used in its original form ($HealthSup_1$). The other two variables were attitudinal questions based on a maternal agreement or disagreement with two statements:

a) "If you ask for help or advice on parenting from professionals like doctors or social workers, they start interfering or trying to take over"
b) "If other people knew you were getting professional advice or support with parenting, they would probably think you were a bad parent"

The responses based on a 5-point Likert scale were re-grouped to identify the mothers who agreed or strongly agreed with these statements. Together, these three variables were expected to capture maternal attitudes towards the involvement of health professionals in aspects of childrearing.

Informal Advice

GUS data include information about other sources of healthy eating advice used, not strictly linked to health professionals (see Table 10). Since these sources did not imply a connection with health professionals they are collectively referred to as informal sources of advice on healthy eating in this thesis. However, some of these sources are better suited to be described as ‘informal’ sources of advice, such as advice from family or friends (*$HEadvice_1$*) and advice from other mothers (*$HEadvice_2$*). Of course, there is a chance that family and friends or other mothers simply re-iterate the advice of health professionals. Given the nature of quantitative data of this kind, it is not guaranteed that advice from other mothers and family is necessarily any different from advice by health professionals, but qualitative evidence in this area seems to suggest that this is the case (Nicolson, 2010).

The other three sources of informal advice are more open to ambiguity, as they capture maternal use of the internet (*$HEadvice_3$*), books and magazines (*$HEadvice_4$*) and TV and radio (*$HEadvice_5$*) for advice on healthy eating. For example, among mothers who reported using books and magazines for advice on healthy eating, some mother may have used an NHS booklet on child nutrition, while other mothers may have consulted a glossy tabloid magazine. The same ambiguity applies to using the internet or the TV and radio for advice. Since these sources cannot be proven to be exclusively drawing on ‘formal’ advice approved by official public health policy, they have been classified as ‘informal’, albeit with a cautionary note with regard to subsequent interpretation of results.

The analytical designs which were adopted in the subsequent analyses sought to explore the causal link between using advice and subsequent feeding practise. However, it may very well be that mothers who intended to feed in a certain way for a reason or another, actively sought information on healthy eating. The underlying temporal order of events could be assumed to be reverse, or another characteristic of the mother may be driving both feeding decisions and maternal use of healthy eating advice. The data in this case is unable to reveal whether mothers adopted certain feeding habits as a result of using advice on eating.

Table 10 Indicators of knowledge of and use of healthy eating advice

ORIGINAL VARIABLE	Derived	NEW VARIABLE	VARIABLE NAME (Both Cohorts)
GENERAL HEALTHY EATING KNOWLEDGE			
How much parent knows about healthy eating (A lot/fair amount/a little/not at all)	→ ✓	How much parent knows about healthy eating A great deal Quite a lot Not very much/nothing at all	**HEknow**
How much parental knowledge about cooking affects what they give their child to eat (A great deal/quite a lot/not very much/nothing at all)	→ ✓	How much parental knowledge about cooking affects what they give their child to eat A lot/fair amount A little/not at all	**Cook**
If used sources of information on healthy eating			**HEinfo**
FORMAL ADVICE			
Used eating info. from health professionals (GP, midwife, health visitor)			**$HealthSup_1$**
"If you ask for help or advice on parenting from professionals like doctors or social workers, they start interfering or trying to take over" (5-point Likert scale)	→ ✓	Health professionals start interfering or trying to take over (Agree & strongly agree)	**$HealthSup_2$**
"If other people knew you were getting professional advice or support with parenting, they would probably think you were a bad parent" (5-point Likert scale)	→ ✓	Bad parent if get parenting advice from professional (Agree & strongly agree)	**$HealthSup_3$**
INFORMAL ADVICE			
Used healthy eating info. from family or friends			**$HEadvice_1$**
Used healthy eating info. from other mothers			**$HEadvice_2$**
Used healthy eating info. from the internet			**$HEadvice_3$**
Used healthy eating info. from books & magazines			**$HEadvice_4$**
Used healthy eating info. from TV & radio			**$HEadvice_5$**

Breastfeeding Advice

A range of questions on maternal use of breastfeeding advice from government funded and voluntary health services were asked in the GUS survey, providing potential for the data to be used as a tool for policy evaluation. This information was used for the analysis and results presented in chapter 7 to look at the relationships between infant nutrition outcomes (*InfantNutr*$_{1\text{-}3}$) and maternal access and use of breastfeeding advice. As for the different sources of healthy eating advice, it would have been interesting to explore differences in infant feeding practices when using advice from 'formal' compared to 'informal' sources. But since information from informal sources of breastfeeding advice was not collected, this analysis could not be conducted. Table 11 indicates what variables were used for the analysis. The only derived variable was constructed to identify mothers who had attended antenatal classes for either the sampled birth or previous births (*Ante*).

Table 11 Indicators of use of breastfeeding advice

ORIGINAL VARIABLE	Derived	NEW VARIABLE	VARIABLE NAME (Both Cohorts)
Attended antenatal classes for this birth (Attended all/attended come/did not attend)	→ ✓	**Attended antenatal classes for this or previous birth** (Yes/No)	**Ante**
Did not attend antenatal classes because had attended for previous pregnancy (Yes/No)	↗		
Received breastfeeding help/advice at the time of the child's birth (Yes/No)			**BFadvice**
Received help/advice from: midwife (Yes/No)			**BFmid**
Received help/advice from: health visitor (Yes/No)			**BFhlthvis**
Received help/advice from: other health professional (Yes/No)			**BFprof**
Received help/advice from: Getting off to a Good Start booklet (Yes/No)			**BFGOGS**
Received help/advice from: National Child Birth Trust (Yes/No)			**BFNCBT**
Received help/advice from: Other voluntary group/org. (Yes/No)			**BFvol**

Since data regarding the use of breastfeeding advice prior to or at the time of birth were asked at 10 months post-partum, recall bias may pose a potential problem for these variables. Perhaps mothers who were given advice but did not use it did not recall having received advice in the first place. Such instances could mask underlying relationships between receiving advice on feeding and subsequent feeding practise.

Indicators of Family Meal Rituals

Chapter 8 in this thesis looks at the extent to which eating patterns of the family as a whole explain how children come to develop their nutritional preferences and habits in the context of family life. GUS collects a wealth of information on children's eating patterns and the ways in which children and their families consume food. Rather than what children eat, eating patterns refer to the *how, when, where, why,* and *with whom* children eat. Table 12 shows the variables used as indicators of family meal habits for the analysis in chapter 8. These indicators of family meal habits were used as independent variables in multivariate models predicting dietary quality among children for the third sweep of the toddler cohort ($Diet_{1\text{-}4}$), when this cohort was 58 months old. All original variables were transformed so as to reduce the number of response categories for each variable, as is shown in Table 12.

Indicators not collected in GUS

Any research based on secondary analysis of survey data can be at times frustrating, because data on issues vital for the research has either not been collected, or it has been collected in an inadequate way. An example relevant for this research can be observed with the nutritional data used to construct a relative dietary quality scale ($DietQual_1$ and $Diet_1$). The survey questions asked specifically how many different fresh/frozen/tinned fruit a child would eat. However, the nutritional quality of fresh versus tinned vegetables varies (Rickman et al., 2007), and it is hypothesised that families who eat fresh versus tinned vegetables are also likely to be of different socio-economic backgrounds. These hypotheses cannot however be explored given the nature of this question in GUS.

A similar example relates to the module enquiring about parental use of breastfeeding advice. It would have been desirable to compare how mothers who use breastfeeding advice from health professionals differ in their characteristics and their infant feeding practices to mothers who used advice from families and friends, or who reported using their own intuition in making infant feeding decisions. A number

Table 12 Indicators of family meal habits

ORIGINAL VARIABLE	Derived	NEW VARIABLE	VARIABLE NAME (Toddler Cohort)
How often child eats with parent & family (SW1-34months) [Every day/ most days/Twice a week/less often/never]	→ ✓	**How often child eats with parent & family (SW1-34months)** Every day/ most days Twice a week/less often/never	**Together1**
How often child eats with parent & family (SW3-58months) [Every day/ most days/Twice a week/less often/never]	→ ✓	**How often child eats with parent & family (SW3-58months)** Every day/ most days Twice a week/less often/never	**Together2**
How often child has meals at regular times [Always/Usually/sometimes/never]	→ ✓	**How often child has meals at regular times** Always Usually/sometimes/never	**Time**
How often child eats same food as parent for main meal [Always/almost always/Sometimes/Never, almost never]	→ ✓	**How often child eats same food as parent for main meal** Always/almost always Sometimes Never, almost never	**Same**
Where child usually eats main meal [Kitchen/ dining room/ living room-dining room/Other room]	→ ✓	**Where child usually eats main meal** Kitchen, dining room, living room-dining room Other room	**Room**
Days last week that child ate take-away meal (e.g. fish & chips) [Scale 0-7]	→ ✓	**Days last week that child ate take-away meal (e.g. fish & chips)** Once or less Twice or more	**Takeaway**
Days last week child ate main meal made with fresh ingredients [Scale 0-7]	→ ✓	**Days last week child ate main meal made with fresh ingredients** 4 times or less 5-7 times	**Fresh**
"Meal-times are a rush" [Quite often/mostly/ Occasionally/ Never]	→ ✓	**"Meal-times are a rush"** Quite often/mostly Never/Occasionally	**Mrush**
"Meal-times give us time to talk to each other" [Quite often/mostly/ Occasionally/ Never]	→ ✓	**"Meal-times give us time to talk to each other"** Quite often/mostly Never/Occasionally	**Mtalk**
"Meal-times gives are enjoyable for everyone" [Quite often/mostly/ Occasionally/ Never]	→ ✓	**"Meal-times gives are enjoyable for everyone"** Quite often/mostly Never/Occasionally	**Menjoy**
How easy or difficult is child to feed? [Very/fairly easy/Neither easy nor difficult/ Fairly/very difficult]	→ ✓	**How easy or difficult is child to feed?** Very/fairly easy Neither easy nor difficult Fairly/very difficult	**Easy**

of qualitative studies have explored the complex nature of infant feeding decisions and the role that advice from health professionals plays in these decisions (Anderson et al., 2001; Nicolson, 2010; Savage et al., 1998), and it would have been interesting to explore these issues using nationally representative quantitative data. This reflexive account on challenges encountered using the data has been fed back to ScotCen, who manage the GUS survey, in the hope that future GUS questionnaires can be amended where this is deemed appropriate.

Methods for Statistical Analysis

Despite the above mentioned limitations, working with secondary analysis brought with it the expected benefits. Time spared from data collection allowed for more time spent for data analysis. Initially, it was envisaged that the longitudinal nature of GUS data could be fully exploited through longitudinal analytical techniques such as fixed and random effects models. In due course the data identified as useful in addressing the set research questions did not support the above longitudinal techniques. This was due to a lack of repeated questions on aspects of child nutrition in sweeps one, two and three. However, given that the nutritional needs and eating habits of children change from birth, through infancy and early childhood, it is unsurprising that questions on children's eating habits were not identical across sweeps.

Fixed or random effects could have been applied to an analysis of changes in children's BMI between sweeps 2 and sweeps 4 of the survey, although analysis of BMI was eventually not included in this thesis, particularly because BMI data suffered from high item non-response (as discussed in page 111). Fixed effect regression models would have allowed for the analysis of change in BMI to also control for omitted variables which might differ between children but stay constant over time (Baltagi, 2001). Random effects regression models, on the other hand, would have allowed for the analysis of change in BMI to control both for the above fixed effects and also control for characteristics of children which change over time but are constant between cases (Baltagi, 2001).

A longitudinal element was still maintained in the analysis design, however, and this involved primarily controlling for lagged variables in multivariate logistic regression models between the first three sweeps of GUS data. Further longitudinal methods were applied in the analysis of breastfeeding duration, involving multivariate proportional hazards regression models. Multivariate regression techniques allow for the evaluation of the *relative* importance of isolated independent variables when controlling for the effect that other independent variables in the model have on the dependent variable. The regression techniques used for this thesis, along with the multicollinearity and post-estimation tests used to evaluate regression models are discussed below.

OLS Linear Regression

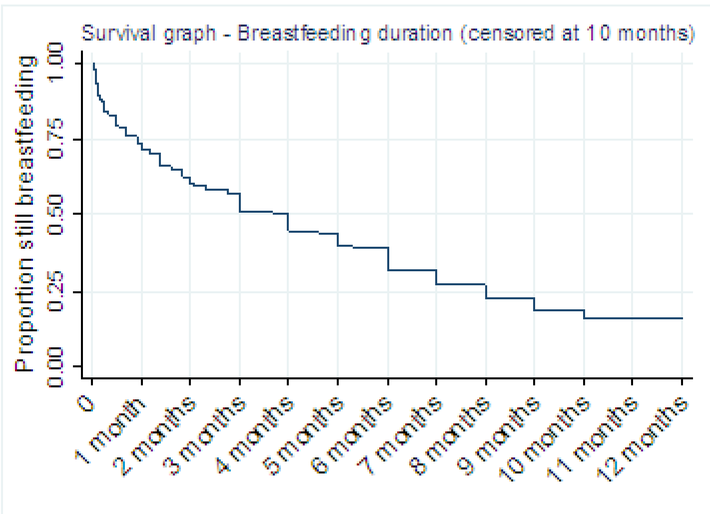
Although Ordinary Least Squares (OLS) regression was not used for any of the results presented in this thesis, given that all regression techniques are, to some extent, conceptually modelled on OLS regression, a brief overview of the method is appropriate. The regression technique is used to test if a linear relationship exists between two or more variables. OLS regression requires continuous or dichotomous predictor variables, and a continuous and unbounded dependent variable (Menard, 1995:4). It also requires all relevant variables to be included and all irrelevant variables excluded from the analysis, and that the relationship between the dependent and independent variables is linear. It assumes that the expected value of the error is zero, that the variance of the error term is constant for all values of the predictor variables (homoscedasticity), and that errors are normally distributed for each set of independent variables (Menard, 1995:5). OLS regression also assumes no correlation between the error terms of different independent variables and between error terms and the independent variables themselves, and that none of the independent variables is a perfect linear combination of any of the other dependent variables.

Proportional Hazards Regression

OLS regression assumes that the dependent and independent variables are normally distributed, and is not ideal for modelling different types of distributions. But the rate at which mothers stop breastfeeding over time decreases exponentially over time and follows an exponential distribution function. For this type of distribution, survival analysis using Proportional Hazards (Cox) Regression is a preferable analytical technique for testing explanatory models of breastfeeding duration in this thesis. This allows for the analysis to account for the non-linear distribution of breastfeeding duration (Allison, 2003; Cleves et al., 2008).

The first stage of analysis involved a visual inspection of survival tables and Kaplan-Meier plots. Figure 6 is a graphical illustration of the rate at which mothers stopped breastfeeding their children over the 10 month post-partum period explored in the analysis. The line in the graph does not touch the x-axis because the period of analysis has been right-censored at 10 months when 16% of mothers were still breastfeeding. Kaplan-Meier plots were produced which compared the survival rates for different categories of single independent variables. A selection of these is presented in Figures 7-9 in chapter 5, where these figures are discussed.

Figure 6 Breastfeeding duration for all mothers in baby cohort



1.Unweighted N: 3034.
2.Data filtered for single-births and cases were mother was biological mother of child

Hazard Ratios

Following the univariate and bivariate analysis, a selection of significant variables were combined to form and test a series of multivariate explanatory models. These provide hazard ratios for the cessation of breastfeeding for each category of the independent variable adjusted for each variable controlled for in the model. The hazard ratios (and 95% confidence intervals) are interpreted in an analogous way as odds ratios from logistic regression results would be. A hazard ratio larger than 1 implies a larger risk of stopping breastfeeding sooner for the category in question compared to a set reference category. A hazard ratio lower than 1 represents a lower risk of early breastfeeding cessation, when compared to the set reference category of that variable (Cleves et al., 2008). The equation and annotation for the proportional hazards regression model can be seen below:

Equation 1 Annotation for the Proportional Hazards Model

$$h(t) = h_0(t)e^{(b_1X_1+b_2X_2+b_3(X_1*X_2)+\varepsilon)} \quad (1)$$

h(t)	- hazard rate
$h_0(t)$	- baseline hazard function which is inferred from the data
t	- the variable measuring time/duration
e	- natural logarithm
β	- vector coefficients for each X
X	- independent variable
X_1*X_2	- interaction terms between two independent variables
ε	- remaining unexplained error.

Interaction Effects

The procedure for testing interaction effects was theory driven and interactions were tested between variables which were expected or assumed to produce statistically significant interaction effects, drawing on the empirical research literature and social theory reviewed. A model without interaction effects was compared to a nested model with interaction effects using the Likelihood-ratio test, based on the chi-square statistic. A statistically significant Likelihood-ratio test would indicate that the additional interaction effects added to a model made a statistically significant contribution to the predictive strength of the overall model and would be included in the final version of that model presented (Allison, 2003).

Post-estimation Tests

Cox Proportional Hazards regression relies on the assumption that the difference in the rate of breastfeeding cessation between groups is proportional over the whole duration of breastfeeding time (Cleves et al., 2008). Along with the visual examination of survival plots, tests of proportionality of assumptions using saved scaled Schoenfeld residuals were carried out for each model to assess whether this assumption was being violated by any of the categories of any of the independent variables. After a model was considered finalised, the final version was re-run on weighted data, thus adjusting the results to the stratified sample design.

Multicollinearity

In order to test for multicollinearity between different independent variables in any multivariate regression model, Menard (1995) suggests using the collinearity tests available for OLS regression analysis. All independent variables for each specified regression model were tested to screen for multicollinearity, and the tolerance value from collinearity diagnostics was used to establish if multicollinearity was a problem. The tolerance used from the diagnostics is reported and its value ranges from 0 to 1 expressing the proportion of a variable not accounted for by other independent variables in the model. While establishing how much collinearity is too much is somewhat arbitrary, some commonly used guidelines suggest that a tolerance of less than 0.200 is cause for concern while a tolerance value of 0.100 strongly indicates that collinearity is a problem (Menard, 1995). Whether any of the independent variables produced tolerance values of less than 0.200 is reported in the results as a note to every table with multivariate regression results.

Binary Logistic Regression

OLS regression is also not suited for the analysis of categorical independent variables. The OLS regression model with a dichotomous dependent variable is called the linear probability model, and the independent variables predict the probability that a case will fall into one of the two response categories of the dependent variable. However, the relationship between independent variables and dichotomous dependent variables is non-linear (Menard, 1995:9). Trying to explain dichotomous dependent variables with linear models is inappropriate and violates many of the assumptions of OLS regression. Logistic Regression models are more appropriate for the analysis of categorical dependent variables.

Logistic Regression has various extensions to accommodate for ordinal dependent variables, like Ordinal Logistic Regression, and for multiple response categorical dependent variables, such a Multinomial Logistic Regression, although the most commonly used application is Binary Logistic Regression, used for the analysis of dichotomous dependent variables (Agresti, 1996). Binary Logistic Regression models were used for the analysis presented in chapter 5 to 8. Most of the dependent variables used for these analyses were not dichotomous to begin with, but were transformed into dichotomous variables for the purpose of the analysis. A deliberate choice was made to not use Ordinal and Multinomial Logistic Regression techniques where these could have been an option, because of the complexities involved in interpreting results in a way which can be easily communicated to non-specialised academic audiences, beneficiaries working in policy, practitioners and the lay audience, which is a key expected output from this doctoral research.

Logistic regression is based on the ‘log likelihood’ of an event occurring. This is the probability that an observed value for the dependent variable can be predicted from the values of the independent variables, and varies from 0 to 1 (Menard, 1995). The log-likelihood (LL) varies from 0 to minus infinity, and is calculated using the maximum likelihood estimation method (MLE). The MLE entails maximising the log-likelihood function, or, how likely it is that observed values of the dependent variable can be estimated from the known values of the independent variables (Agresti, 1996:8-10). This can be compared to OLS regression which seeks to minimize the sum of squared distances of the data points to the regression line.

Logistic regression is also popular because it has less stringent assumptions than OLS linear regression. It does not assume a linear relationship between the dependent and independent variables, nor that variables are normally distributed, while it also does not require constant error terms for all independent variables (Menard, 1995). Nevertheless, logistic regression *does* assume that the independent variables are linearly related to the *logged odds* of the outcome variable. This is because it relies on the logarithmic transformation of the data to transform a substantively non-linear relationship between the variables into a linear form, thus avoiding the violation of the assumption of linearity (Field, 2000:165). Logistic regression assumes that independent variables are not linearly related to each other, as multicollinearity among independent variables compromises the reliability of the estimated coefficients, so standard errors and coefficients may become inflated (Menard, 1995:65). An overview of the analytical procedure and the tests used to evaluate model fit is outlined below. Equation 2 specifies the equation for the binary logistic model.

Equation 2 Annotation for the Logistic Regression Model

$$Logit\ (Y) = a + \beta_1(X_1) + \beta_2(X_2) + \beta_3(X_1 * X_2) + \varepsilon \tag{2}$$

Logit - Natural logarithm of the odds
Y - Dependent variable
α - coefficient of the constant
β_1 - coefficient of the 1st independent variable
X_1 - 1st independent variable
X_1*X_2 - Interaction effects between two or more independent variables
ε - remaining unexplained error

A range of statistical tests carried out with logistic regression help to evaluate how well the models predicted the dependent variable. A brief explanation is provided below to aid the interpretation of the models presented in the results.

Interaction Effects

The procedure for testing interaction effects was recently discussed in page 146 in this chapter.

Odds Ratios

Odds ratios reported for independent variables in models represent the proportional increase or decrease in the odds of being in one outcome category as opposed to the other, for each unit of increase in the independent variable or continuous variables. For categorical independent variables, the odds of each category are compared to a reference category. The odds ratio is also a measure of effect size, and indicates relative importance of each predictor variable in terms of its effect on the dependent variable outcome and can be compared to the effect of other predictors in the model (Menard, 1995).

Nagelkerke Pseudo R^2

In OLS regression, R^2 can be used to assess the percent of variance explained by a set of predictors. However, the equivalent measure is not applicable in logistic regression because the variance of a dichotomous or categorical variable depends on the frequency distribution of that variable, reaching a maximum for dichotomous variables which have a 50-50 split (Field, 2000). This means that R^2 measures for logistic regressions with differing marginal distributions of their respective dependent variables cannot be compared directly. Analogous pseudo-R^2 measures have been proposed and Nagelkerke's R^2 is most often quoted in logistic regression as a measure of strength of association, ranging from 0 to 1. As it is based on the improved log-likelihood of a model compared to an null model, it should not be interpreted as the percentage of variance explained. Nagelkerge R^2 is reported for every binary logistic regression model run in chapters 5-8.

Hosmer & Lemeshow Goodness of Fit tests

To assess if the model is accurately predicting the dependent variable, the Hosmer & Lemeshow goodness of fit test is usually reported. It tests if the model's prediction of the dependent variable is statistically significantly different from the observed values of the dependent variable, based on a chi-square test. If the test indicates non-significance ($p>0.05$), then there is *no* statistically significant difference between the model's prediction of the outcome variable and the actual values, and the model is therefore predicting the dependent variable *well* (Menard, 1995:21). This Goodness of Fit Statistic is reported for every binary logistic regression model run in the analysis chapters.

Residuals

Agresti (1996) stresses that analysis of residuals is often neglected. The post-hoc tests included saving standardised residuals and scanning for cases with standardised residuals at ± 3. The amount of cases with standardizes residuals at ± 3 are reported with the results presented in the subsequent chapters. These measures are a way of checking how accurately the model is classifying cases, and whether there are selected extreme outliers for which the model does not fit well (Field, 2000).

Pregibon Leverage (Hat value)

The analysis of leverage aims to identify if there are cases in the distribution which are outliers and have a strong influence on the overall estimate of a fitted regression model. It may be that one specific value differs from the rest in the model and is influential enough to skew the estimates of the overall fitted model for the sample. In this case, it could be worth excluding that case from the analysis and fitting the model on the remaining sample. By general rule of thumb, a leverage (hat) value greater than 2 or 3 times the average leverage of all cases in the model (Menard, 1995; Pregibon, 1981). The number of observations which have a leverage three times the average leverage of the distribution or more are reported with the model diagnostics with every table presenting multivariate logistic regression results (referred to as 'high leverage').

Software

The analysis and results presented in the subsequent chapters was carried out using the Stata software version 10.1 (StataCorp, College Station, TX, USA). SPSS version 16.0 was occasionally used for data browsing.

Next Chapters

Four substantive results chapters follow, which layout the key results, analysis and discussion emerging from this doctoral research. Chapter 5 looks at the relationships between maternal human capital and children's nutritional outcomes in infancy and early childhood. Chapter 6 explores the relationships between maternal human capital and maternal use of formal and informal sources of advice on child nutrition. Chapter 7 looks at the relationships between maternal healthy eating knowledge and maternal use of advice on child nutrition and children's nutritional outcomes in infancy and toddlerhood. Chapter 8 explores how children's nutritional trajectories develop from their early experiences of breastfeeding, weaning and eating, and also looks at the relationship between family meal rituals and children's dietary quality at 5 years of age.

CHAPTER 5
Mothers Matter: Maternal human capital and nutrition in infancy and early childhood

Introduction

This chapter explores the extent to which maternal human capital influences children's nutrition from infancy to early childhood, looking at breastfeeding, the introduction of solids, and dietary quality in toddlerhood. The main aim of this chapter is to assess the relationship between maternal human capital, and children's nutrition in infancy and early childhood. As a secondary aim, the analysis of breastfeeding duration also assesses how maternal employment and maternity leave influence breastfeeding duration. A brief summary of the relevant policy development, the empirical research literature and the theoretical concepts informing this chapter is provided below.

Social Policy

The review of related policy development indicated that there is a strong desire to reduce health inequalities by addressing the health of children (NHS Scotland, 2006;

Scottish Government, 2007; Scottish Government, 2008b). The review also indicated that public health policy relies extensively on initiatives which aim to inform and educate parents about healthy eating (Lang et al., 2009), as discussed in chapter 2. This approach relies on the assumption that a lack of knowledge about healthy eating is the cause of sub-optimal nutrition and health inequalities among families and children. But this approach does not acknowledge the overarching structural social inequalities which influence children's food experiences and their health outcomes (Delormier et al., 2009). The Healthy Start Scotland initiative has been somewhat more comprehensive, and aside from educating parents on healthy eating, it also provides parents who receive certain benefits with vouchers to be exchanged for healthy foods. At best, this approach could improve children's diets, but it has limited power to address the underlying social inequalities which result in these parents not being able to buy healthy foods in the first place. For a full discussion of policy developments see chapter 2.

Maternity Leave

A brief review of maternity leave and pay policy at UK level indicated that the current leave arrangements are generous in length, but less generous in terms of pay. Following the first 6 weeks paid at 90% of average weekly earnings, a flat rate of £124.88/week is provided for up to 33 more weeks. This flat rate payment is likely to prompt mothers, particularly those without partners, to return to work sooner rather than later (Rubery, 2008). Thus, this is unlikely to support mothers to breastfeed exclusively for the 6-8 weeks which the Scottish Government currently recommends. Further discussion on this topic can be found on page 62 in chapter 2.

Empirical Research Literature

A full review of related empirical research literature can be found in chapter 1. In brief, the literature review indicated that maternal income, occupational classification and educational characteristics have been found to be associated with breastfeeding practice (Arlotti et al., 1998; Avishai, 2007; Bailey et al., 2004; Earland et al., 1997; Hamlyn et al., 2002; Houston et al., 1983; Jeliffe and Jeliffe, 1978; Jones et al., 1986). Limited evidence suggests that similar patterns hold for weaning (Bolling et al., 2007). Finally, a vast body of research has linked low incomes to poor nutritional outcomes for children (Dobson et al., 1994; Dowler et al., 2001). More recently, some studies have focused on the relationships between maternal education and children's diets (Cooke et al., 2003; Northstone et al., 2005). The analysis of social inequalities in child nutrition has relied primarily on capturing these inequalities through variables capturing differences in occupational characterises or household income, while overlooking the importance of maternal education. Educational qualifications are traditionally interlinked with occupation and income, but some recent research suggests that, in relative terms, maternal educational qualifications are a better dimension through which to capture social inequalities in breastfeeding practice than maternal occupational classification or household income (Dex, 2008; Skafida, 2009). Evaluating how maternal occupational characteristics, household income and maternal education relate to children's nutritional outcomes from birth is thus one of the aims of this thesis.

Maternity Leave

Research on breastfeeding has confirmed the importance of maternal employment for breastfeeding duration (Baxter 2008; Baxter et al., 2009; Cooklin et al., 2008; Earland et al., 1997; Guendelman et al., 2009; McKinley and Hyde, 2004; Rea et al., 1997; Roe et al., 1999). The existing research, however, is primarily from non UK samples which were usually non-representative, and are now fairly dated, with few exceptions (Guendelman et al., 2009; Hawkins et al., 2007). These studies cannot explain the context in which breastfeeding takes place in contemporary Scotland, nor can they explain the association between employment or maternity leave and breastfeeding duration while controlling for factors known to influence breastfeeding. This gap in evidence will be addressed in this chapter.

Social Theory

This thesis combined ideas of different proponents of theories of capital, using an amalgamation of the human capital introduced by Becker (1993) and the cultural and economic capital discussed by Bourdieu (1984). Becker stressed that education was a central element in shaping human capital. This contrasts to Bourdieu who appeared to place less importance on education in contributing to his idea of cultural capital (see chapter 3, page 81 for a more elaborate discussion).

Theories of human capital suggest families with more human capital are more likely to adopt preventative health behaviours (Becker, 1993). Bourdieu and Passeron suggest that different social groups relate to their bodies in different ways. Higher social, cultural and economic capital generates a desire to transform such capital into physical capital. This can be obtained by pursuing healthy lifestyles, and human capital is thus also associated with better health (Bourdieu and Passeron, 1977). Among other things, Bourdieu used the concept of cultural capital to explain socially stratified differences in *tastes*, including tastes for food (Bourdieu, 1984). Thus, the food *tastes* of any individual, if understood as the product of cultural capital, can be considered to be a result of neither conscious nor unconscious choices. However, the above ideas have been developed to describe the behaviours and health outcomes of *adults*, and do not adequately explain how children come to develop a *taste* for healthy living. It is hypothesised that children's parents pursue healthy behaviours *on their children's behalf* when children are too young to do so themselves. These ideas have been elaborated in full in chapter 3.

Analysis and Results

The analysis in this chapter focuses on how different facets of maternal human capital relate to children's diets in infancy and the early years. More specifically, the chapter addresses the following research question:

Q.1 Do parents with more human capital help to cultivate physical capital in their children by making healthy nutrition choices?

Three different indicators are used to capture differences in human capital. While two of these indicators are based solely on the mother, household income will reflect the incomes of both parents in two-parent dual-earner families. While an argument could be made to control for indicators of paternal human capital exclusively, exploratory analysis showed that indicators based on the mother's education and occupation were more useful predictors of children's nutritional outcomes than father-based indicators.

Apart from the three key independent variables capturing primarily maternal human capital, the following factors known to affect children's nutritional outcomes were also controlled for in the analytical models: children's gender, children's birth weight, children's birth order, mother's age at birth of the sample child, mother's ethnic background, family composition. The analysis of breastfeeding duration also controlled for the mother's employment status during pregnancy and any maternity leave taken, as employment and maternity leave have been shown in other research to influence breastfeeding duration.

Breastfeeding Duration

Proportional Hazards Regression

For the analysis of breastfeeding duration, and given the nature of the data being duration data, survival analysis through Proportional Hazards (Cox) Regression was the preferred method for testing the proposed explanatory models. An overview of the methods and statistical tests used for this part of the research was provided in the Methodology chapter, page 143.

Kaplan-Meier plots comparing the survival rates for different categories of single independent variables are presented in Figures 7 to 9 and these are discussed later in this chapter. The tests of equality of these curves, i.e. whether the difference in rates of giving up breastfeeding was statistically significant were carried out using the log-rank test, and significance values are shown in the top right corner of each plot.

Following this bivariate analysis single variables were combined in a larger multivariate proportional hazards regression model. After running several exploratory models, one final model was used for the analysis, and Equation 3 formulates the combination of variables used to explain breastfeeding duration.

Saved scaled Schoenfeld residuals were examined for each model to assess whether the assumption of proportionality of hazards over the analysed time period was being violated by any of the categories of any of the independent variables.

Interaction effects were tested between selected variables where interaction effects were expected to exist, drawing on theory-based rationale and on previous research. When interaction effects were statistically significant, and when they statistically significantly improved the overall predictive power of the model (based on the Likelihood-ratio chi-square statistic at $p \leq 0.05$) they were included in the final model presented in the results. The explanation of annotated variables outlines which variables are derived, and points to the page in chapter 4 where variable derivations are explained.

Equation 3 Maternal human capital and breastfeeding duration

$$\begin{aligned} h(t)BFduration &= h_0(t)\exp(\beta Sex + \beta BWeight + \beta Par \\ &+ \beta Edu + \beta NSSEC + \beta Income \\ &+ \beta Age + \beta Eth + \beta FamStat + \beta Emp \\ &[+\beta Matern + \varepsilon]) \end{aligned} \tag{3}$$

BFduration	- Sweep 1: Breastfeeding duration in days (among mothers who breastfed at least once)[6] [derived, see page 118]
Sex	- Sweep 1: Child's sex
Bweight	- Sweep 1: If children were underweight at birth [see page 130]
Par	- Sweep 1: Child's birth order
Edu	- Sweep 1: Highest maternal educational qualifications achieved
NSSEC	- Sweep 1: Maternal occupation classification
Income	- Sweep 1: Banded household income[7]
Age	- Sweep 1: Mother's age at the birth of the sample child

[6] Breastfeeding duration was censored at 10 months which was when the first GUS interview took place. While follow-up data on breastfeeding was collected in subsequent sweeps, data on maternity leave was *not* collected, and a full analysis of the effect of employment and maternity leave on breastfeeding duration had to be limited to the first 10 months where the required data had been collected.

[7] Income data in GUS was only collected in banded form.

Eth	- Sweep 1: Mother's ethnicity
FamStat	- Sweep 1: Family composition, whether a lone-parent family
Emp	- Sweep 1: Mother's employment status [derived, see page 130]
Matern	- Sweep 1: Length of paid and unpaid maternity leave taken [derived, see page 130]
ε	- error term

Using the above variables, a sequential nested model was run, where the first model included only employment status (*Emp*) and therefore the sample of mothers who were and were not in work while pregnant with the sample child. The second model also controlled for maternity leave (*Matern*), on a reduced sample looking only at mothers who had been in work while pregnant with the sample child.

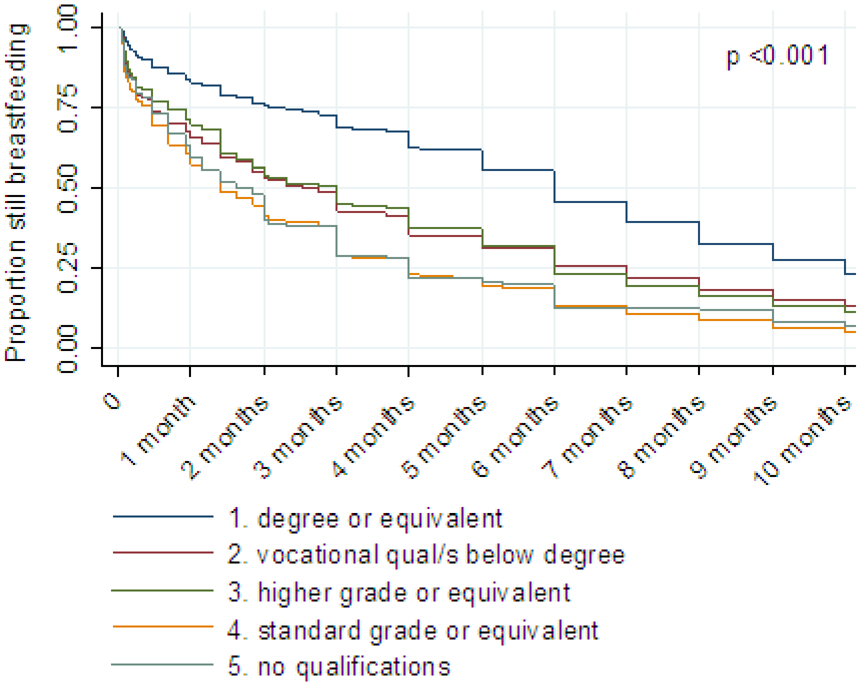
The model relies on survival analysis of duration, but it should be noted that the data used to determine this duration was collected retrospectively, and the associated implications for the validity of recall data need to be considered. The same concern applied to the length of maternity leave, which was also based on recall. More importantly, data on income was collected at 10 months post-partum and is subject to short-term drops in maternal income during maternity leave. Thus, while the income variable was to allow for the analysis of any causal relationship between income prior to birth and subsequent feeding habits, the nature and timing of income data collected in GUS mean that this variable is unlikely to appropriately or fully account for the relationship between income and breastfeeding duration.

Human Capital and Breastfeeding Duration

Three Kaplan-Meier plots (Figures 7-9) indicate the first stages of bivariate analysis of breastfeeding duration. The plots shown below illustrate the differences in breastfeeding 'survival curves', otherwise understood as breastfeeding duration, for each category of the independent variable in question: maternal education in Figure 7, maternal NS-SEC in Figure 8 and household income in Figure 8. Figure 7 shows that mothers with different educational backgrounds breastfeed for different amounts of time. Those with degree level education were far more likely to breastfeed for longer. Those most likely to stop breastfeeding sooner were mothers with no qualifications and those with standard grade or equivalent qualifications. A notable result was that mothers in managerial and professional occupations and those who were self-employed were those most likely to breastfeed for longer (Figure 8). Also, mothers who were in routine occupations were those most likely to stop breastfeeding earlier on. The relationship between household income and breastfeeding duration (Figure 9) seems to be fairly straightforward, with children in lower income households being less likely to be breastfed for longer periods of time.

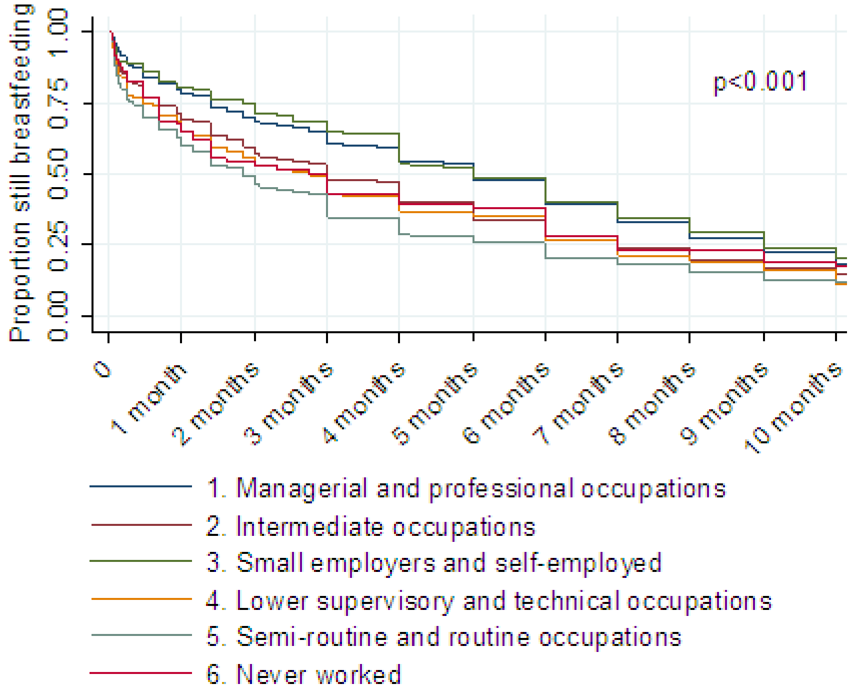
All three indicators of human capital are statistically significant predictors of breastfeeding duration. The different survival curves merge towards the right hand side of the graph, so it seems the relationship between human capital indicators and breastfeeding is more pronounced in the earlier stages of feeding. After approximately 6-8 months, the ‘survival’ rates for breastfeeding start to look fairly similar for mothers from different occupational and income groups, but this convergence does not apply when looking at mothers with different educational backgrounds (Figure 7). In fact, it seems that mothers with degree level education remain less likely to stop breastfeeding even at 10 months when compared to all other educational categories. At 10 months there is roughly a 20% discrepancy in the proportion of mothers who stopped breastfeeding comparing those with no qualifications and those with degrees.

Figure 7 Kaplan-Meier plot - Breastfeeding duration by Maternal Educational Qualifications



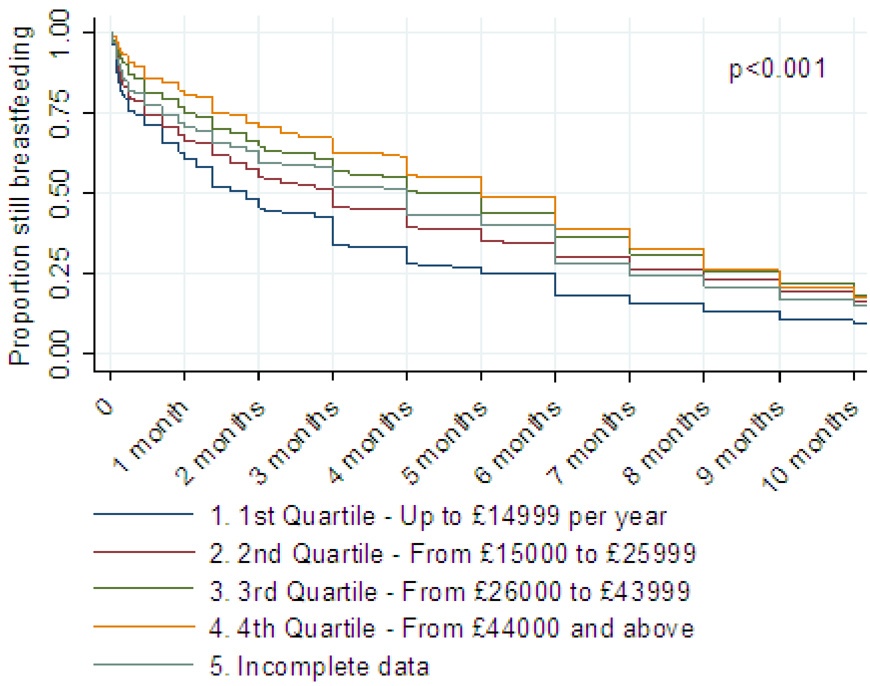
1.Unweighted N: 3030. Data filtered for single-births and cases were mother was biological mother of child

Figure 8 Kaplan-Meier plot - Breastfeeding duration by Maternal NS-SEC



1.Unweighted N: 2999. Data filtered for single-births and cases were mother was biological mother of child

Figure 9 Kaplan-Meier plot - Breastfeeding duration by Household Income



1.Unweighted N: 3034. Data filtered for single-births and cases were mother was biological mother of child

Table 13 shows how breastfeeding duration, among mothers who reported breastfeeding at least once, differs among a range of factors known to influence infant feeding patterns. All three indicators of human capital were statistically significantly associated with breastfeeding take-up and with duration at 6 weeks. Looking in greater detail at breastfeeding duration and maternal education, 83% mothers with degrees had breastfed for at least 6 weeks, while the 95% confidence interval indicates that the true value for this population is likely to be somewhere between 80.4% and 85.2%. On the contrary, 57% of mothers with no qualifications breastfed at least six weeks, with the true value for this population being somewhere between 49.0% and 64.0%. The large confidence interval suggests this percentage was based on a small sample, and that there was a lot of variety in breastfeeding duration within this group. Differences in breastfeeding duration by maternal education were statistically significant, as the chi-square statistic of $p \leq 0.001$ indicates. Maternal age at the time of birth, family composition, and the child's birth order were also statistically significant predictors of breastfeeding duration, while children's gender, birth weight and maternal ethnic background were not statistically significant predictors.

The importance of employment was also of particular interest, with Table 13 showing that part-time self-employed mothers were most likely to breastfeed for at least six weeks (86%) while part-time employees and mothers not in work being the least likely to do so (69% and 70% respectively). There were some interesting findings when looking at the sub-sample of working mothers who had breastfed at least once (N:1689) and the relationship between maternity leave and breastfeeding duration. The results suggested that mothers who took longer maternity leave, were more likely to breastfeed for 6 weeks or more. This trend, however, did not apply for mothers who took between no leave and up to 1 month of leave from work. In fact, among this latter group 87% of mothers breastfed for 6 weeks or more. Thus, the relationship between maternity leave and breastfeeding duration is not strictly linear, it is slightly bell-shaped, as shown in Figure 10. This was suspected to be related to the fact that most working mothers taking minimal amount of maternity leave were more likely to be self-employed mothers.

Table 13 Descriptive bivariate analysis - Breastfeeding duration by human capital

All mothers (adjusted %)	SW1 - Breastfed at least once % [95 %CI] N:5051		P value	SW1 -Breastfed 6 wks or more % (Excluding never breastfed) [95 %CI] N:3117		P value
All mothers	60.4	[57.8-62.9]		70.5	[68.3-72.6]	
Child's gender			=0.265			=0.147
Male	40.9	[38.2-43.6]		71.6	[68.8-74.2]	
Female	41.5	[38.7-44.5]		69.3	[66.6-71.8]	
Birth weight			=0.187			=0.751
Birth weight not low	60.7	[58.1-63.2]		70.5	[68.3-72.7]	
Low birth weight	56.4	[49.9-62.7]		69.5	[62.6-75.5]	
Sample child's birth order			≤0.001			≤0.001
First birth	62.8	[59.8-65.7]		66.8	[63.8-69.6]	
Subsequent birth	58.0	[54.9-61.0]		74.5	[72.0-76.9]	
Mother's education (SW1)			≤0.001			≤0.001
Degree or Equivalent	86.8	[84.8-88.5]		82.9	[80.4-85.2]	
Vocational qualification below degree	58.5	[55.9-61.1]		64.3	[60.8-67.7]	
Higher grade or equivalent	61.7	[56.2-66.8]		67.6	[61.2-73.5]	
Standard grade or equivalent	40.8	[36.9-44.8]		56.3	[51.3-61.1]	
No qualifications	29.6	[25.1-34.5]		56.6	[49.0-64.0]	
Mother's NS-SEC (SW1)			≤0.001			≤0.001
Managerial and professional	78.9	[76.6-81.0]		78.2	[75.4-80.7]	
Intermediate	60.4	[57.1-63.7]		68.2	[64.3-71.9]	
Small employers & self-employed	72.6	[64.8-79.2]		79.2	[70.3-85.9]	
Lower supervisory and technical	48.3	[42.2-54.4]		64.3	[55.2-72.5]	
Semi-routine and routine	45.8	[42.2-49.3]		58.3	[54.6-62.0]	
Never worked	30.4	[23.5-38.2]		62.8	[51.5-72.8]	
Annual household income–Quartiles (SW1)			≤0.001			≤0.001
Up to £14,999	40.2	[36.7-43.8]		58.1	[54.1-62.0]	
£15,000 - £25,999	58.4	[55.2-61.6]		65.7	[61.2-69.9]	
£30,000 – £43,999	70.5	[67.8-73.1]		74.8	[71.0-78.2]	
£44,000 or more	81.9	[79.1-84.3]		80.7	[77.6-83.4]	
Missing data	63.2	[57.4-68.6]		70.3	[64.9-75.3]	
Mother's age at birth [1]			≤0.001			≤0.001
Under 20	32.7	[26.3-39.7]		42.7	[34.1-51.7]	
20 to 29	54.3	[51.4-57.1]		65.1	[62.0-68.0]	
30 to 40	69.9	[67.5-72.1]		75.5	[73.1-77.7]	
40 or older	73.8	[65.8-80.4]		86.2	[79.9-90.8]	
Mother's ethnic background			≤0.001			=0.197
White	59.5	[57.0-62.0]		70.2	[68.0-72.4]	
Other	81.6	[74.2-87.2]		74.9	[67.6-81.1]	
Family composition (SW1)			≤0.001			≤0.001
Couple household	66.8	[64.4-69.1]		72.9	[70.7-75.0]	
Single parent household	35.6	[32.0-39.4]		52.9	[47.7-58.0]	
Employment status during pregnancy			≤0.001			=0.010
Full-time, employee	70.7	[66.7-74.4]		71.4	[67.5-74.9]	
Full-time, self-employed	83.6	[71.6-91.2]		77.8	[59.0-89.5]	
Part-time, employee	63.7	[60.9-66.4]		69.1	[65.8-72.2]	
Part-time, self-employed	80.5	[72.9-86.3]		86.3	[77.2-92.1]	
Not in work	52.9	[49.5-56.3]		69.7	[66.7-72.6]	
Leave from work - paid & unpaid - sw1		(N:3110)	≤0.001		(N: 2127)	≤0.001
No leave - up to 1 month	53.9	[37.5-69.5]		86.9	[69.0-95.2]	
Over 1 month – up to 2 months	65.9	[52.2-77.3]		61.9	[46.5-75.1]	
Over 2 months – up to 3 months	58.5	[50.1-66.5]		61.3	[47.6-73.4]	
Over 3 months – up to 4 months	57.7	[50.2-64.8]		64.4	[53.0-74.3]	
Over 4 months – up to 5 months	64.3	[57.7-70.4]		64.7	[57.8-71.0]	
Over 5 months – up to 6 months	64.5	[61.8-67.1]		68.4	[64.8-71.8]	
Over 6 months	76.3	[72.8-79.5]		79.2	[74.9-82.9]	
Still on leave at sweep 1	75.3	[69.7-80.1]		81	[75.0-85.8]	

1.Age is presented in banded form but the continuous variable for age was used in regression analyses
2.Data filtered for single-births and cases were mother was biological mother of child
3.Percentages are based on weighted data; N values are based on un-weighted data

Table 14 shows the results of the proportional hazards regression model aiming to predict which mothers breastfed for less than 6 weeks. A Hazard Ratio (HR) larger than 1 implies a larger probability of stopping breastfeeding sooner for the category in question, while a ratio lower than 1 represent of lower risk of stopping breastfeeding sooner, when compared to the set reference category of that variable. Model 1 looks at all mothers who breastfed at least once. Looking at the child's birth order for Model 1, the results show that first-time mothers were at a statistically significantly higher risk of stopping breastfeeding sooner, with a Hazard Ratio of 1.187, compared to the reference category of mothers of subsequent born children. The 95% confidence interval indicated that the true hazard ratio in the population would lie somewhere between 1.097 and 1.284.

Table 14 also shows that among the three indicators of human capital, maternal education was the only one which statistically significantly predicted breastfeeding duration in the multivariate model, with NS-SEC and income being poor predictors. Mothers with no qualifications were most likely (Hazard Ratio 2.204) to stop breastfeeding sooner compared to mothers with degrees, and the relative risk of stopping breastfeeding sooner decreased as the educational qualifications of the mother increased. While the NS-SEC and household income variables had appeared highly statistically significant predictors of breastfeeding duration in the bivariate analysis, this was no longer the case after controlling for education and other confounders in the multivariate survival analysis.

The relatively higher importance of education compared to occupational classification as a basic explanatory factor of breastfeeding *initiation* among mothers in Scotland has been discussed in previous research looking at Scottish trends (Skafida, 2009). The current results suggest that education remains a more useful explanatory variable than NS-SEC or household income for understanding and explaining differences in the *duration* of breastfeeding as well. They confirm the trend that was identified in the exploratory Kaplan-Meier plots (Figures 7-9). However, given the previously discussed problematic nature of the income data collected for mothers in the first sweep of GUS, it should be noted that the relatively weaker predictive power of income in determining feeding outcomes could simply be a result of the poor quality of this variable. Perhaps an analysis using a variable on maternal income collected *prior* to birth would yield different results, and this cannot be explored with the data available in the GUS survey.

Clearly, there is a relationship between NS-SEC and education, with more educated mothers being more likely to be in more privileged occupational categories and higher income groups. Ultimately, income, NS-SEC or education all capture aspects of human capital which in turn explain differences in breastfeeding trends. However, the results suggest that maternal education as an indicator of maternal human capital can go further in explaining differences in breastfeeding duration than a distinction based on maternal occupation or household income. Perhaps the link between educational capital and breastfeeding is more direct than it would be between income or employment and breastfeeding. As suggested by Skafida (2009), the longer time spent in formal education might make mothers better equipped to self-educate themselves on topics such as infant nutrition, and make them more aware of and prone to respond to recommendations regarding optimal infant feeding.

Employment and Breastfeeding

The results presented in this part of the analysis have been published in a peer reviewed journal (Skafida 2011)[8]. The multivariate proportional hazards regression model 1 in Table 14 shows that compared to mothers not in work while pregnant with the sample child, those who were part-time employees, and those who were full-time employees were statistically significantly more likely to give up breastfeeding sooner (Hazard Ratio of 1.334 and 1.608), while controlling for other confounders in the model,. There were no statistically significant differences comparing mothers who were not in work and mothers who were self-employed during pregnancy. This is perhaps not surprising, considering that self-employed mothers are more likely to

[8] An author-created version of this publication has been included in Appendix B, and the full article can be accessed at the Maternal and Child Health Journal [doi:10.1007/s10995-011-0743-7]

work from home, and as such better able to maintain prolonged breastfeeding while multi-tasking with work-related responsibilities.

Table 14 Multivariate proportional hazard regression - risk of breastfeeding cessation

Variable reference categories in italics	**MODEL 1 - SW1 -Breastfeeding duration (up to 10 months)** (excludes mothers who never breastfed) (N:2994)		**MODEL 2 – SW1 -Breastfeeding duration (up to 10 months)** (excludes mothers not working during pregnancy) (N:1644)	
	Hazard Ratios	**[95% CI]**	**Hazard Ratios**	**[95% CI]**
Child's gender *(Male)*				
Female	1.024	[0.949,1.105]	0.985	[0.883,1.099]
Birth weight *(Birth weight not low)*				
Low birth weight	0.934	[0.779,1.120]	0.825	[0.601,1.133]
Sample child's birth order *(Subsequent birth)*				
First birth	1.187***	[1.097,1.284]	1.239***	[1.120,1.370]
Mothers Education (SW1)				
Degree or equivalent				
Vocational qual/s below degree	†1.608***	[1.447,1.786]	†1.587***	[1.387,1.816]
Higher grade or equivalent	1.607***	[1.412,1.828]	1.588***	[1.330,1.895]
Standard grade or equivalent	2.151***	[1.836,2.520]	2.287***	[1.833,2.853]
No qualifications	2.204***	[1.770,2.745]	2.013**	[1.308,3.096]
Mother's NS-SEC (SW1)				
Managerial and professional				
Intermediate	0.949	[0.838,1.074]	0.870	[0.740,1.023]
Small employers & self-employed	0.975	[0.753,1.263]	0.716	[0.483,1.063]
Lower supervisory and technical	0.835	[0.666,1.047]	0.766	[0.579,1.013]
Semi-routine and routine	1.052	[0.938,1.181]	0.854	[0.708,1.031]
Never worked	0.906	[0.662,1.242]		
Annual household income – Quartiles (SW1)				
Up to £14,999	1.074	[0.925,1.248]	1.234	[0.923,1.651]
£15,000 - £25,999	†0.965	[0.848,1.098]	1.067	[0.881,1.293]
£30,000 – £43,999	0.877*	[0.793,0.971]	0.938	[0.821,1.072]
Missing data	0.962	[0.836,1.108]	1.004	[0.828,1.217]
£44,000 or more				
Mothers age (in years)	0.966***	[0.958,0.974]	0.965***	[0.954,0.977]
Mother's ethnic background *(Other)*				
White	0.904	[0.759,1.076]	1.242	[0.799,1.932]
Family status (SW1) *(Couple household)*				
Single parent household	1.123	[0.973,1.297]	1.214	[0.961,1.534]
Employment status during pregnancy				
Not in work			[omitted category]	
Full-time, employee	†1.608***	[1.408,1.836]	*Fulltime employee (ref)*	
Full-time, self-employed	1.349	[0.926,1.963]	0.869	[0.559,1.350]
Part-time, employee	1.334***	[1.205,1.477]	0.872*	[0.767,0.992]
Part-time, self-employed	1.001	[0.781,1.282]	0.723	[0.503,1.037]
Leave from work (paid and unpaid)				
Still on leave at sweep 1				
None/up to 1 month			1.305	[0.884,1.927]
Over 1/up to 2 months			1.587*	[1.028,2.449]
Over 2/up to 3 months			1.528*	[1.072,2.178]
Over 3/up to 4 months			1.683*	[1.132,2.502]
Over 4/up to 5 months			1.513**	[1.157,1.978]
Over 5/up to 6 months			1.303	[0.998,1.701]
Over 6/up to 10 months			1.011	[0.767,1.332]

1.Data filtered for single-births and cases were mother was biological mother of child
2.Percentages are based on weighted data; N values are based on un-weighted data
3.Significance levels: * p <0.05, ** p <0.01, *** p<0.001
4.†Hazard ratio not proportional over tim*e*

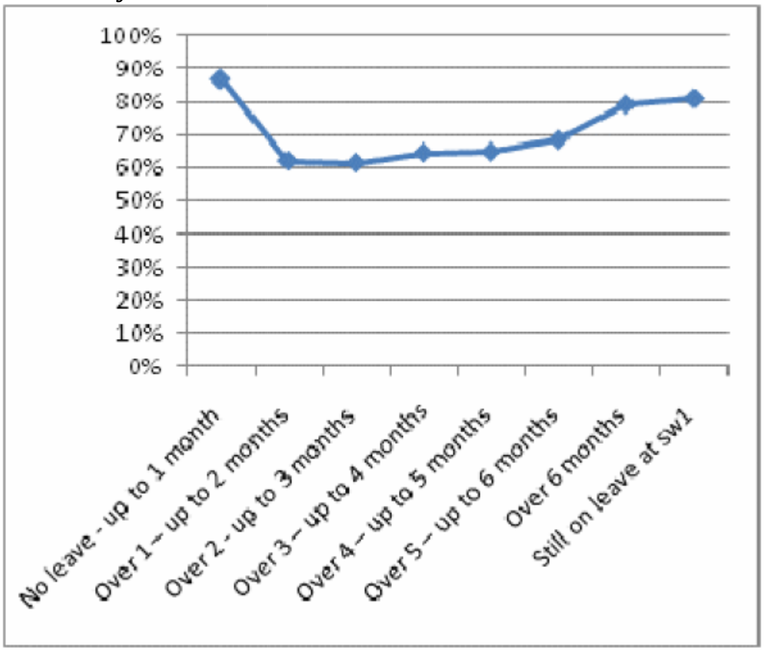
Drawing on theories which suggest that juggling work and infant feeding is difficult for mothers, non-working mothers might be expected to have the highest take-up and longest duration of breastfeeding among all mothers, given their greater opportunity to do so. The bivariate analysis in Table 13, however, suggested that this was not the case. Non-working mothers were least likely to initiate breastfeeding (53%) and among those who did breastfeed, non-working mothers were less likely to breastfeed for 6 weeks or longer (70%) than all but mothers who were part-time employees (69%). As the multivariate survival analysis revealed, it was not the lack of employment which was associated with a lower predisposition towards breastfeeding, but other common characteristics of non-working mothers, such as being younger and having fewer educational qualifications, which in turn accounted for the negative relationship between unemployment and breastfeeding.

Model 2 in Table 14 focuses on the relationships between taking maternity leave (paid and unpaid) and breastfeeding duration. Thus this model was run only on the subsample of mothers who were in work during pregnancy and who breastfed at least once (N: 1644). Figure 10 also helps to illustrate the distribution of mothers who breastfed for 6 weeks or more by different categories of maternity leave. It suggests that, with the exceptions of mothers who took no leave or up to 1 month of leave, there was an incremental positive relationship between longer maternity leave and a higher likelihood that mothers would breastfeed for at least 6 weeks.

The results from the multivariate survival analysis suggest that maternity leave is positively associated to breastfeeding duration, with longer leave allowing for longer breastfeeding spells for working mothers, controlling for the remaining confounders in the model, and controlling for the mother's employment type (*Emp*). Looking at Table 14, there appears to be a statistically significant negative relationship between taking less maternity leave and breastfeeding duration. For example, compared to mothers who were still on maternity leave at the sweep 1 interview (which occurred 10 months after the sample child's birth), the category who took over 1 and up to 2 months of leave had a higher risk (HR 1.587) of stopping breastfeeding sooner.

There was no statistically significant difference in breastfeeding duration between those who took over 5 and up to 6 months, or over 6 and up to 10 months of leave and those still on leave at the first sweep of the survey

Figure 10 Proportion of mothers breastfeeding for 6 weeks or more by maternity leave



It was interesting to see that there was no statistically significant difference between those who took no leave or up to 1 month off from work and those who were still on leave. Perhaps the small sample size for this particular category (N:25) was partly responsible for a statistically non-significant result. But subsequent analysis indicated that half of these mothers (N:15) were self-employed, meaning that they may have not taken a lot of maternity leave because their flexible working conditions resulting from being self-employed enabled them to combine work and breastfeeding. This groups breastfeeding trends may thus have been largely captured by the variable capturing maternal employment status in the model (*Emp*).

The post-estimation examination tests on the proportionality of assumption, using Schoenfeld scaled residuals, showed that for some categories of independent variables (marked with a † in Table 14) the differences in stopping breastfeeding were not proportional over time. This means that the gap, or discrepancy, in the proportion of mothers stopping breastfeeding among mothers with, e.g. vocational qualifications compared to those with degrees, did not remain stable over the 10 month period used for the analysis. Thus, the Hazard Ratios provided for these three specific categories are problematic to interpret because the actual Hazard Ratios for giving up breastfeeding are likely to vary at different time-points over the 10 month period explored in the analysis.

Weaning and Diet Quality

Binary Logistic Regression

The rest of the analysis was based on binary logistic regression models (An overview of the method and the post-estimation statistics used was outlined in chapter 4, page 147). The first stages of analysis drew on descriptive bivariate analysis of relationship between the independent and dependent variables. These were weighted to reflect the population that the sample represents, while un-weighted table counts are reported. Following this bivariate analysis single variables were combined in a larger multivariate binary logistic regression model. After running several exploratory models, one final model is used for the discussion.

Equation 4 formulates the combination of variables used to explain the relationship between maternal human capital and the introduction of solids in children's diets (see chapter 4 chapter for further details on the dependent variables). Interaction effects were tested between selected variables where interaction effects were expected to exist, and if they were statistically significant, and improved the overall predictive power of the model (based on the Likelihood-ratio chi-square statistic at $p \leq 0.05$), they were included in the final results. The explanation of annotated variables outlines which variables are derived, and points to the page in chapter 4 where variable derivations are explained.

Equation 4 Maternal human capital and weaning

$$Logit\ (InfantNutr_3) = a + \beta(Sex) + \beta(BWeight) + \beta(Par)$$
$$+ \beta(Edu) + \beta(NSSEC) + \beta(Income) + \beta(Age) + \beta(Eth)$$
$$+ \beta(FamStat) + \beta(Age * FamStat) + \varepsilon \qquad (4)$$

$InfantNutr_3$	- Sweep 1: Whether solids were first introduced before the child was 4 months old [derived, see page 121]
Sex	- Sweep 1: Child's sex
Bweight	- Sweep 1: If children were underweight at birth [see page 130]
Par	- Sweep 1: Child's birth order
Edu	- Sweep 1: Highest maternal educational qualifications achieved
NSSEC	- Sweep 1: Maternal occupation classification
Income	- Sweep 1: Banded household income[9] [derived, see page 128]
Age	- Sweep 1: Mother's age at the birth of the sample child
Eth	- Sweep 1: Mother's ethnicity
FamStat	- Sweep 1: Family composition, whether a lone-parent family
Age*FamStat composition	- Statistically significant interaction between maternal age and family
ε	- error term

As was specified in the chapter 4, the variable on weaning collected in GUS only specifies when solids were 'first introduced' to infants. As having introduced solids does not necessarily imply that infants are no longer feeding on formula or breast-milk, this variable does not necessarily accurately capture the process of *weaning* from infants from a milk-based to a solid foods-based diet for all infants in the sample. Also, there is no variable to account for when mothers stop breastfeeding and start using formula milk, prior to introducing solids in the infant's diet. This explains why, for example, why about 35% of mothers with degrees had stopped breastfeeding before 4 months (from Figure 7), but only about 6% had introduced solids before 4 months (Table 15). The largest proportion of those mothers who had

[9] Income data in GUS was only collected in banded form.

stopped breastfeeding feeding by 4 months, had moved on to formula milk without yet introducing solids in the child's diet. Caveats related to recall bias on weaning data, and caveats related to the temporal order during which income data were collected and the time-period which the outcome variable reflects have been discussed on page 158 in this chapter and also apply to the above described analytical model.

Human Capital and Weaning

Much as maternal human capital is an important determinant of breastfeeding, it was expected to be equally influential in determining weaning outcomes for children. Table 15 shows the bivariate analysis of the relationship between individual predictors of weaning outcomes. Current government guidelines advise that children are weaned ideally after 6 months but at least no earlier than 4 months of age. In light of these guidelines, the analysis of weaning aimed to tease out the extent to which maternal human capital explained whether parents introduced their children to solid food prematurely, i.e. before babies had turned 4 months of age.

The bivariate analysis (Table 15) showed that indicators of human capital were positively associated with a lower likelihood of premature weaning. More specifically, 6% of mothers with degrees compared to 23% of mothers with no qualifications weaned prematurely. Analogous figures were 9% for mothers in managerial and professional occupations, compared to 23% of those who never worked, and 7% of those with household incomes of £44,000 or more compared to 24% of those in households earning up to £14,999. All three indicators of human capital were individually statistically significant predictors of weaning. Furthermore, children who were: male, of low birth-weight, first-born, of white ethnic backgrounds and living in single parent households were more likely to be weaned before turning 4 months old.

The results from the multivariate logistic regression predicting premature weaning (Table 16) were largely in line with the previously discussed results on breastfeeding duration. The pseudo-R^2 value for this model (0.11) suggests that there are factors influencing weaning which are not fully captured in this model. While maternal education was a strong predictor of premature weaning, maternal NS-SEC and household income were poor and not statistically significant predictors of weaning when controlling for education and other confounders in the model. Mothers with no qualifications had a 170% higher chance (Odds Ratio 2.670) of weaning prematurely compared to mothers with degrees. The chance of weaning prematurely decreased as the number of qualifications increased.

Household income was not a statistically significant predictor when controlling for other variables in the model. As for maternal NS-SEC, it appears that only self-employed mothers differed statistically significantly in weaning practices from those in managerial professions, and this group was more likely (OR 1.585) to wean prematurely compared to mothers in managerial and professional occupations. It would make sense that mothers who are self-employed and working from home, spend more time eating near and around their babies than mothers who spend an 8-hour working day away from their babies. Thus, babies of self-employed mothers, when these mothers work from home, have far more opportunities of being ‘exposed’ to solid foods in everyday life by perhaps being allowed to taste the food that the mother might be eating herself while at home.

Table 15 Bivariate analysis - Weaning and human capital

Adjusted %	SW1 -Child weaned before 4 months (N:4972)	[95%CI]	P value
All mothers	15.8	[14.8-16.9]	
Child's gender			
Male	17.3	[15.9-18.9]	=0.002
Female	14.3	[13.0-15.6]	
Birth weight			
Birth weight not low	12.4	[9.3-16.4]	
Low birth weight	16.1	[15.0-17.1]	=0.059
Sample child's birth order			
First birth	17.3	[15.8-18.9]	=0.007
Subsequent birth	14.4	[13.0-15.9]	
Mother's education (SW1)			
Degree or Equivalent	5.5	[4.4-6.7]	≤0.001
Vocational qualification below degree	18.1	[16.5-19.9]	
Higher grade or equivalent	16.2	[13.0-20.0]	
Standard grade or equivalent	22.4	[19.9-25.1]	
No qualifications	23.3	[19.5-27.6]	
Mother's NS-SEC (SW1)			
Managerial and professional	8.7	[7.4-10.3]	≤0.001
Intermediate	15.2	[13.0-17.7]	
Small employers & self-employed	17.8	[12.9-24.0]	
Lower supervisory and technical	22.2	[18.1-27.1]	
Semi-routine and routine	21.5	[19.3-23.7]	
Never worked	22.6	[18.0-28.1]	
Annual household income – Quartiles (SW1)			
Up to £14,999 (1315)	24.3	[22.1-26.6]	≤0.001
£15,000 - £25,999 (1131)	18.5	[16.0-21.3]	
£30,000 – £43,999 (1265)	9.9	[8.3-11.6]	
£44,000 or more (823)	7.4	[5.7-9.7]	
Missing data (517)	13.8	[11.0-17.2]	
Mother's age at birth [1]			
Under 20	27.4	[23.4-31.8]	≤0.001
20 to 29	19	[17.4-20.8]	
30 to 40	11.1	[9.8-12.6]	
40 or older	12.7	[8.3-18.9]	
Mother's ethnic background			
Other	7.6	[4.4-12.8]	=0.003
White	16.1	[15.1-17.2]	
Family status (SW1)			
Couple household	12.7	[11.8-13.8]	≤0.001
Single parent household	27.8	[25.0-30.8]	

1.Data filtered for single-births and cases were mother was biological mother of child.
2.Percentages are based on weighted data; N values are based on un-weighted

Table 16 Multivariate logit model – Weaning and human capital

Variable reference category in italics	MODEL 1 - SW1 - Child Weaned before 4 months (N:4909)	
	Odds Ratios	**[95% CI]**
Child's gender		
Male		
Female	0.791**	[0.678,0.923]
Birth weight		
Birth weight not low		
Low birth weight	0.645*	[0.456,0.912]
Sample child's birth order		
Subsequent birth		
First birth	0.679***	[0.568,0.812]
Mothers Education (SW1)		
Degree or equivalent		
Vocational qual/s below degree	2.495***	[1.891,3.292]
Higher grade or equivalent	2.196***	[1.446,3.334]
Standard grade or equivalent	2.611***	[1.807,3.772]
No qualifications	2.670***	[1.746,4.084]
Mother's NS-SEC (SW1)		
Managerial and professional		
Intermediate	1.085	[0.825,1.426]
Small employers & self-employed	1.585*	[1.088,2.308]
Lower supervisory and technical	1.255	[0.857,1.838]
Semi-routine and routine	1.115	[0.829,1.499]
Never worked	1.141	[0.775,1.681]
Annual household income – Quartiles (SW1)		
Up to £14,999	1.319	[0.903,1.928]
£15,000 - £25,999	1.422	[0.969,2.086]
£30,000 – £43,999	0.922	[0.651,1.307]
Missing data	1.048	[0.685,1.604]
£44,000 or more		
Mother's ethnic background		
Other		
White	0.503*	[0.276,0.916]
Family status (SW1)		
Couple household		
Single parent household	0.555	[0.262,1.179]
Interaction Effects		
Mother's age * Family Status (single parent)	0.990	[0.968,1.012]
Mother's age * Family Status (couple)	0.950***	[0.930,0.971]

1.Data filtered for single-births and cases were mother was biological mother of child**.**
2.Percentages are based on weighted data; N values are based on un-weighted
3.Significance levels: * p <0.05, ** p <0.01, *** p<0.001.
4.Mod 1: Nag. R2 = 0.11, Goodness of Fit p=0.2492, Standardized Residuals <3, High leverage = 93 obs., Tolerance > 0.200

It would seem that of the three indicators used to capture differences in human capital, it is maternal education which provides the most useful distinction between groups of mothers, and provides a more accurate tool for capturing aspects of human capital which influence maternal choices on breastfeeding and weaning. Maternal NS-SEC and household income were not very good predictors of weaning when controlling for other confounders in a multivariate analysis.

Significant interaction effects were found between maternal age and family composition, which were controlled for in the model. The results indicate that older mothers were less likely to wean prematurely if they lived in couple households (0R 0.950 for each year) but this association between age and weaning was not statistically significant for children in single parent households. Also, while employment status and employment leave were included in the analysis of breastfeeding, these variables were expected to be less influential in determining weaning outcomes. Exploratory analysis confirmed these ideas as employment status and maternity leave were not statistically significant predictors of weaning when controlling for the other confounders in a multivariate model and have not been included in the results presented here. Perhaps some characteristics which would have been captured by employment status (*Emp*) were already being captured by the NS-SEC variable in the model.

Nutrition in Childhood

The analysis of breastfeeding and weaning indicated that of the three human capital indicators used in this analysis, maternal education was the most useful indicator capturing differences in choices which mothers make regarding infant feeding. This section examines whether a similar pattern applies to babies' and toddlers' diets.

Binary Logistic Regression

Binary logistic regression models were used to explore the relationship between indicators of human capital and nutrition in childhood. Equation 5 and Equation 6 formulate the combination of variables used to explain the relationship between maternal human capital and children's dietary quality at the age of 22 months and at the age of 58 months. The two equations specify two almost identical regression models to predict the likelihood of having a relatively poor diet among toddlers aged 22 months (*DietQual₁*) and among children aged 58 months old (*Diet₁*). Further details regarding the variables selected and derived for this analysis can be found in chapter 4, page 122. The explanation of annotated variables outlines which variables are derived, and points to the page in the chapter 4 where variable derivations are explained.

Equation 5 Human capital and dietary quality (baby cohort at 22 months)

$$Logit\,(DietQual_1) = a + \beta(Sex) + \beta(BWeight) + \beta(Par) + \beta(Edu2) + \beta(NSSEC2) + \beta(Income2) + \beta(Age) + \beta(Eth) + \beta(FamStat2) + \varepsilon \qquad (5)$$

Equation 6 Human capital and dietary quality (toddler cohort at 58 months)

$$Logit\,(Diet_1) = a + \beta(Sex) + \beta(BWeight) + \beta(Par) + \beta(Edu3) + \beta(NSSEC3) + \beta(Income3) + \beta(Age) + \beta(Eth) + \beta(FamStat3) + \varepsilon \qquad (6)$$

$DietQual_1$	- Sweep 2: Whether child in Baby Cohort was in the poorest diet category based on a relative dietary quality scale [derived, see page 122]
$Diet_1$	- Sweep 3: Whether child in Toddler Cohort was in the poorest diet category based on a relative dietary quality scale [derived, see page 122]
Sex	- Sweep 1: Child's sex
Bweight	- Sweep 1: If children were underweight at birth [see page 130]
Par	- Sweep 1: Child's birth order [derived, see page 130]
Edu2	- Sweep 2: Highest maternal educational qualifications achieved by sweep 2
Edu3	- Sweep 3: Highest maternal educational qualifications achieved by sweep 3
NSSEC2	- Sweep 2: Maternal occupation classification at sweep 2
NSSEC3	- Sweep 3: Maternal occupation classification at sweep 3

Income2 - Sweep 2: Banded household income[10] at sweep 2 [derived, see page 128]
Income3 - Sweep 3: Banded household income[10] at sweep 3 [derived, see page 128]
Age - Sweep 1: Mother's age at the birth of the sample child
Eth - Sweep 1: Mother's ethnicity
FamStat2 - Sweep 2: Family composition, whether a lone-parent family
FamStat3 - Sweep 3: Family composition, whether a lone-parent family
ε - error term

The variable capturing dietary quality is a binary measure based on a relative diet scale constructed from questions on children's consumption of fruit, vegetables, crisps, chocolate, sweets and sugary soft-drinks (see page 122 for more details on the derivation of the dietary quality scale).This binary variable identifies children which are in the poorest dietary group compared to the average diet among children in the sample. Children in the poorest dietary group have a lower consumption of vegetables and fruit and a higher consumption of crisps, chocolate, sweets and soft drinks than other children in the sample.

Unlike the analysis of breastfeeding and weaning, the analysis of dietary quality looks at the eating habits of both cohorts in the GUS survey. Dietary information for the baby cohort was collected in sweep 2 when this cohort was 22 months old, and in sweep 3 for the toddler cohort which was 58 months (just under 5 years old) at the time. The dietary information for the two cohorts should not be compared, since separate relative diet scales were constructed for each cohort, and children aged 22 months are expected to have different nutritional habits and needs to those aged 58 months. What will be compared is the extent to which different independent variables, and particularly indicators of human capital, contribute in explaining which children have the least healthy nutritional habits in each cohort.

The models outlined in equation 5 and 6 are essentially drawing on cross-sectional data available in GUS. The only longitudinal element in the model is the variable

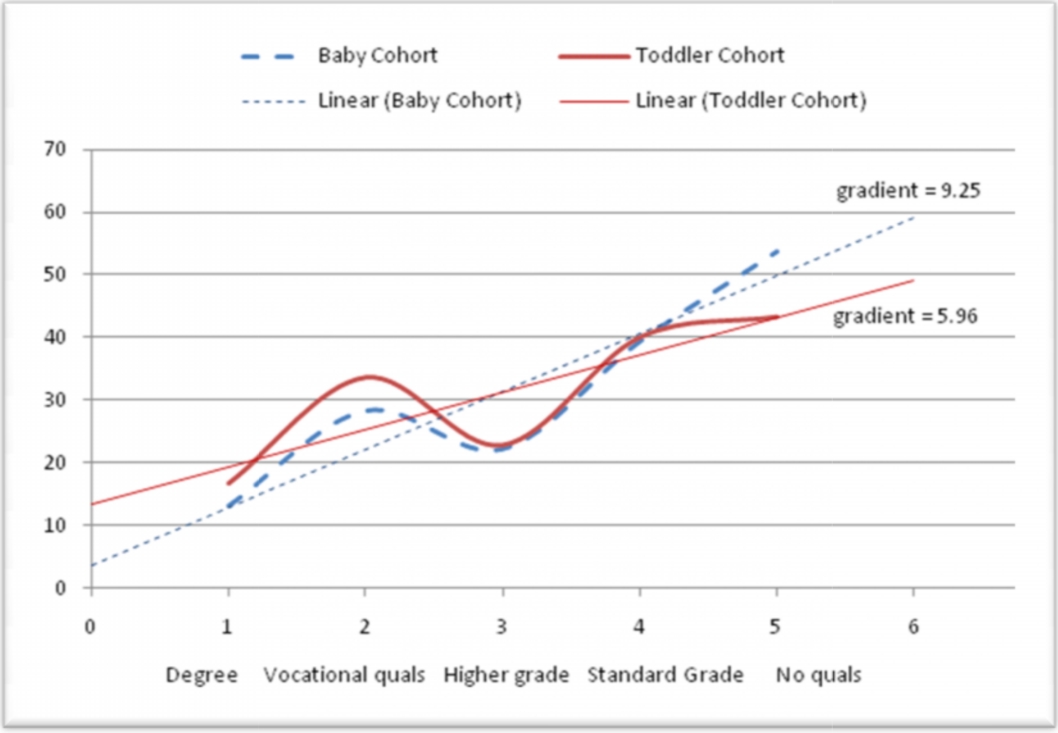
[10] Income data in GUS was only collected in banded form.

capturing children's birth weight. While this variable was collected retrospectively at the first survey sweep, parents were advised as part of interviewer guidance to check children's weight from children's official birth report cards, where these were available.

Human Capital and Child Nutrition

What was noticeable from the exploratory bivariate analysis was an incremental negative relationship between increasing levels of education, more advantaged occupational circumstances and increasing household income, and the likelihood of being in the poorest diet category. While this trend applied to both the baby and toddler cohorts, overall differences in dietary quality between the extreme categories for education, NS-SEC and income were larger for mothers of the baby cohort compared to the toddler cohort. To illustrate with some figures, for the baby cohort 13% of mothers with degrees and 54% of those with no qualifications had children in the poorest diet category, a discrepancy of 41% percent between extremes. The analogous figures for the toddler cohort where 17% for mothers with degrees and 43% among those with no qualifications, which is a relatively smaller discrepancy of 26% between extremes. This trend has been illustrated in Figure 11 which shows that the gradient for maternal education and the likelihood of being in the poorest category is *steeper* for the baby cohort (9.25) than for the toddler cohort (5.96).

Figure 11 Proportion of children in poor diet category by maternal education – Baby and Toddler Cohorts



A similar pattern can be observed for NS-SEC, income, maternal age at the time of birth, and to some extent for ethnicity and family composition, with differences between categories being 'larger' for the baby cohort than for the toddler cohort. This discrepancy between extremes is reflected in the multivariate analysis results (Table 18). Looking at maternal education, for the baby cohort, mothers with no qualifications had a 240% higher chance (OR 3.372) of having children in the poorest diet category compared to those with degrees. For children in the toddler cohort the analogous figure was 95% (OR 1.951).

There could be two explanations for this phenomenon, both of which are likely to have influenced the results to some extent. Firstly, at 5 years of age, toddlers have a far wider spectrum of factors which influence their diets than is the case for babies aged just under 2 whose diets are more determined by the immediate family the child lived with. Compared to 2-year olds, 5 year-olds are likely to be spending more time with their father, in day care, with other children, and more likely to be vocal about their preferences for food. Their mothers will also not be able to supervise what their children are eating at all times, and the dietary data may not be as accurate as that given for 2-year old children.

The second reason for this discrepancy between cohorts could be purely a methodological one regarding the high drop-out rate which GUS suffered at each subsequent sweep particularly among parents in more disadvantaged groups of society. Survey weights applied to the bivariate and multivariate analysis do aim to correct for non-response bias, but it is possible that as parents from poorer backgrounds dropped out of the survey (cumulatively more at sweep 3 than at sweep 2 alone), a more homogenous population of parents remained in the survey, smoothing out differences between more and less advantaged groups in society.

Finally, reflecting on the relationship between human capital and children's dietary habits, the results re-iterate what emerged from the analysis of breastfeeding and weaning. Maternal education was a statistically significant predictor of both babies' and toddlers' diet quality, with NS-SEC and income being inferior as predictive variables when controlling for education and other confounders. Also, the pseudo-R^2 values are fairly low for each of the two models and if anything the values suggest that the variables controlled for in the analysis where slightly better at predicting diets for the baby cohort (0.14) than the toddler cohort (0.10).

It is interesting to note that the income variables used for the analysis of children's dietary quality were based on income at sweep 2 and income at sweep 3. Thus, these variables are less likely to be as drastically affected by falls in family income resulting from mothers going on maternity leave, as is likely to be the case for the income variable collected at sweep 1. Of course, family income may still be lower in the first years following child birth since many mothers return to work part-time. Thus, with these relatively more robust measures of family income from sweeps 2 and 3, it is encouraging – in terms of identifying a consistent trend in the data – that maternal educational qualifications appear to be a stronger dimension through which to capture differences in children's dietary quality, compared to NS-SEC and household income.

Table 17 Bivariate Analysis – Diet quality and human capital

Diet quality category (adjusted %)	**SW2-BABY COHORT at 22 months [Sweep 2] % in Poorest Diet Category [95% CI] (N:4357)**		**P value**	**SW3-TODDLER COHORT at 58 months [Sweep 3] % in Poorest Diet Category [95% CI] (N:2243)**		**P value**
All mothers	28.2	[26.3-30.2]		30.1	[27.7-32.5]	
Child's gender			=0.276			=0.329
Male	27.1	[24.9-29.5]		30.9	[27.8-34.3]	
Female	29.4	[26.9-32.0]		29.1	[26.2-32.2]	
Birth weight			=0.519			=0.242
Low birth weight	31.8	[25.6-38.6]		37.6	[28.5-47.8]	
Birth weight not low	28	[26.1-30.1]		29.6	[27.2-32.1]	
Sample child's birth order			≤0.001			≤0.001
Subsequent birth	31.9	[29.6-34.3]		33.6	[30.6-36.7]	
First birth	24.5	[22.1-26.9]		26.2	[23.3-29.3]	
Mothers Education (SW2/SW3)			≤0.001			≤0.001
Degree or equivalent	13.1	[11.0-15.4]		16.7	[13.9-19.9]	
Vocational qual/s below degree	28.3	[25.8-30.8]		33.6	[30.4-36.9]	
Higher grade or equivalent	22.2	[18.2-26.8]		22.8	[17.4-29.5]	
Standard grade or equivalent	39.4	[35.0-43.9]		40	[34.6-45.6]	
No qualifications	53.8	[48.7-58.8]		43.3	[35.2-51.7]	
Mother's NS-SEC (SW2/SW3)			≤0.001			≤0.001
Managerial and professional	15.7	[13.7-18.0]		20.6	[17.9-23.6]	
Intermediate	25.7	[22.8-28.9]		28	[23.7-32.8]	
Small employers and & self-employed	24.7	[19.0-31.6]		22.3	[15.0-31.9]	
Lower supervisory and technical	33.9	[28.3-40.0]		26.9	[19.8-35.3]	
Semi-routine and routine	40.2	[37.6-42.9]		40.9	[36.6-45.3]	
Never worked	49.6	[40.7-58.5]		49.2	[36.4-62.1]	
Annual household income – Quartiles (SW2/SW3)			≤0.001			≤0.001
Up to £14,999	44.6	[41.0-48.3]		45.5	[40.4-50.7]	
£15,000 - £25,999	28.2	[25.3-31.4]		35.9	[30.8-41.2]	
£30,000 – £43,999	22	[19.9-24.4]		25.6	[21.7-29.9]	
£44,000 or more	13.9	[11.3-16.9]		18.9	[15.4-23.0]	
Missing data	31	[25.0-37.7]		22	[15.2-30.8]	
Mother's age at birth [1]			≤0.001			=0.002
Under 20	45.4	[40.1-50.8]		39.7	[30.4-49.9]	
20 to 29	31	[28.3-33.9]		33.8	[30.3-37.5]	
30 to 40	23.4	[21.3-25.7]		25.8	[22.9-28.9]	
40 or older	20.5	[14.8-27.6]		22	[13.5-33.8]	
Mother's ethnic background			=0.030			=0.811
Other	39.2	[30.5-48.7]		27.2	[19.9-36.0]	
White	27.8	[25.8-29.8]		30.2	[27.8-32.7]	
Family status (SW2/SW3)			≤0.001			≤0.001
Couple household	24.5	[22.7-26.4]		27	[24.5-29.7]	
Single parent household	43.2	[39.0-47.6]		40.8	[35.7-46.2]	

1.Data filtered for single-births and cases were mother was biological mother of child
2.Percentages are based on weighted data; N values are based on un-weighted data

Table 18 Multivariate logit models – Diet quality and human capital

Variable reference categories in italics	MODEL 1 - SW2- Poorest Diet Category [Baby Cohort - 22 months] (N:4331)		MODEL 2 – SW3- Poorest Diet Category [Toddler Cohort - 58 months] (N: 2173)	
	Odds Ratios	**[95% CI]**	**Odds Ratios**	**[95% CI]**
Child's gender *(Male)*				
Female	1.182*	[1.024,1.365]	0.920	[0.753,1.125]
Birth weight *(Birth weight not low)*				
Low birth weight	0.921	[0.664,1.279]	1.208	[0.767,1.903]
Sample child's birth order *(Subsequent birth)*				
First birth	0.640***	[0.553,0.740]	0.664***	[0.539,0.818]
Mothers Education (SW2/3)				
Degree or equivalent				
Vocational qual/s below degree	1.699***	[1.323,2.183]	1.934***	[1.414,2.645]
Higher grade or equivalent	1.204	[0.856,1.693]	1.234	[0.768,1.982]
Standard grade or equivalent	2.257***	[1.713,2.974]	2.095***	[1.541,2.847]
No qualifications	3.372***	[2.408,4.722]	1.951**	[1.285,2.963]
Mother's NS-SEC (SW2/3)				
Managerial and professional				
Intermediate	1.210	[0.965,1.516]	0.967	[0.699,1.339]
Small employers & self-employed	1.148	[0.780,1.689]	0.701	[0.422,1.165]
Lower supervisory and technical	1.391	[0.966,2.001]	0.753	[0.471,1.204]
Semi-routine and routine	1.513***	[1.210,1.892]	1.255	[0.944,1.669]
Never worked	1.579*	[1.016,2.454]	1.704	[0.905,3.209]
Annual household income – Quartiles (SW2/3)				
Up to £14,999	1.972***	[1.491,2.608]	1.987**	[1.316,3.000]
£15,000 - £25,999	1.307	[0.994,1.719]	1.530*	[1.056,2.217]
£30,000 – £43,999	1.328*	[1.053,1.675]	1.189	[0.852,1.660]
Missing data	1.345	[0.930,1.944]	0.848	[0.494,1.457]
£44,000 or more				
Mothers age (in years)	0.980*	[0.965,0.996]	0.990	[0.969,1.011]
Mother's ethnic background *(Other)*				
White	1.476	[0.979,2.225]	1.166	[0.757,1.796]
Family status (SW2/3) *(Couple household)*				
Single parent household	1.205	[0.959,1.513]	1.041	[0.745,1.455]

1.Data filtered for single-births and cases were mother was biological mother of child
2.Percentages are based on weighted data; N values are based on un-weighted data
3.Significance levels: * p <0.05, ** p <0.01, *** p<0.001
4.Mod 1: Nag. R2 = 0.14, Goodness of Fit p=0.1406, Standardized Residuals <3, High leverage = 64 obs., Tolerance > 0.200
5.Mod 2: Nag. R2 = 0.10, Goodness of Fit p=0.1931, Standardized Residuals <3, High leverage = 10 obs., Tolerance > 0.200

Discussion

This chapter set out to meet one major objective. It aimed to understand to what extent human capital affects children's nutrition in infancy and early childhood. The analysis assessed the relationship between maternal education, maternal NS-SEC, and household income, as indicators of maternal human capital, with children's nutrition from birth to early childhood. As a secondary objective, the chapter assessed the relationships between maternal employment and maternity leave with breastfeeding duration.

The results of the analysis showed that maternal education was consistently the most useful indicator for human capital in capturing differences in breastfeeding duration, the introduction of solids, and dietary quality. The results also showed that employment which required the mother to work away from home was detrimental to longer breastfeeding periods, as were shorter periods of maternity leave. The discussion which follows relates these results to the body of empirical and theoretical literature which informed this research. The chapter then concludes with some general reflections on the implications that these results have for the relevant social policy fields.

Inequalities in Child Nutrition

With regard to child nutrition the analysis showed that differences in feeding and eating habits for infants and children are socially differentiated among children of parents with different socio-economic and educational profiles. Of the three indicators of human capital used for the analysis, maternal education resulted consistently as a superior predictor of nutritional differences, when compared to maternal NS-SEC and household income. Children of mothers with more educational qualifications were significantly more likely to have experienced optimal nutrition at all stages of early childhood. These children were more likely to be breastfed; to be breastfed for longer; to be weaned after 4 months and to consume a healthier diet in their early years.

These results are broadly in line with reviewed existing research which suggested that parents from more advantaged backgrounds were more likely to breastfeed their children for longer (Arlotti et al., 1998; Bailey et al., 2004), more likely to wean later (Bolling et al., 2007), and more likely to have healthier diets (Nelson, 2000; Seguin et al., 2003). Also, most studies looking at socially stratified differences in children's diets focus primarily on the effect of parental income and parental occupation on children's food consumption (Dowler et al., 2001; Nelson, 2000) and fewer studies focus on the importance of maternal education (Cooke et al., 2003; Northstone et al., 2005).

The present analysis shows that not only is maternal education an *important* dimension through which to capture inequalities in children's nutritional trajectories, it is potentially a *relatively more useful* dimension than income or occupation-related classifications schemes. These findings are in line with some recent research which concluded that maternal education was a superior indicator for capturing differential patterns towards breastfeeding initiation, compared to maternal occupational status or household income (Dex, 2008; Skafida, 2009).

This does not imply that material constraints posed by low incomes do not affect the food choices parents make. However, maternal education, unlike household income, is a way to differentiate between groups of *mothers* in society, and thus focuses on the characteristics of the parent most likely to be in charge of children's nutrition. The indicator on household income does not reveal how decisions about the expenditure of such income is negotiated *between* parents, in two-parent households. Also, as women are often overqualified for the jobs they work in, and might take child-related career-breaks, their occupational status or income may not always reflect their educational capital. When exploring social inequalities linked to women's lives and decisions, it may be more useful to compare social strata based on maternal education, rather than on occupational status or household income.

The results highlight the positive link between maternal human capital and children's food consumption, and the effects that real material constraints, like living on very low incomes, are likely to have on the food choices which parents *can* and do make when feeding their children. This resonates with ideas raised by Carter (1995) and Wall (2001) regarding the importance of recognising that a lack of educational as well as financial resources can put a real limit the extent to which parents are able to exercise choice and agency when feeding children.

Reflecting on Sen's concept of capabilities and resources (Sen, 1984), and on Bourdieu and Passeron's concepts of cultural capital and acquisition of 'tastes' (Bourdieu and Passeron, 1977), maternal decisions regarding breastfeeding, the introduction of solids, and nutrition in later childhood are formed within the realm of what these parents know is possible and plausible to achieve, given the material and educational resources they have access to. Thus, societal groups with more human capital are better equipped to transform such capital into physical capital by valuing and pursuing healthier lifestyles. Making healthier nutritional choices can be understood as the conscious production of 'physical capital' which is socially learned and inherited by children through shared eating opportunities in the family.

What the present findings add is an emphasis on the importance of educational capital, and particularly of maternal educational capital, in shaping the acquisition of these 'tastes' and in determining the production of children's 'physical capital'. This is particularly interesting in light of the different importance attributed to educational qualifications in defining human capital by different proponents of human capital theories. As was discussed in chapter 3, page 81, the concept of human capital used in this thesis amalgamated the ideas on human capital introduced by Becker (1993) and ideas of cultural and economic capital discussed by Bourdieu (1984). Becker stressed that education was a central element in shaping human capital. This contrasts to Bourdieu who discussed educational capital in passing only as a smaller component of cultural capital, possibly stressing to a greater extent the effect of economic capital.

Yet, Bourdieu elaborated to greater depth how forms of capital influence individuals' health behaviours and *tastes* for food, in contrast to Becker who did not fully elaborate on the links between human capital and health outcomes. Perhaps this partly explains why compared to Bourdieu's ideas of capital, Becker's human capital has been relatively less influential in sociology, and particularly in the sociology of health and illness. The impact of Becker's theory of human capital remained largely confined within the realm of economics, and he stressed the beneficial impact that investment in education, and thus in human capital, could have on the economy.

Given that the findings presented in this chapter stress the superiority of maternal education in predicting maternal feeding choices and children's dietary quality, it may be worth considering how Becker's theory of human capital which stresses the importance of investing in education and training, could be further expanded to explain differences in human health behaviours, and in how children are socialised into adopting different preferences for food. This could complement other theories of capital more often encountered in sociological work, which may not give education the attention it deserves.

Breastfeeding Duration and Employment

The results suggest that employment does interfere with a mother's ability to breastfeed for longer, as mothers who were not in paid employment were more likely to breastfeed for longer. However, not all jobs are created equal, and while mothers working as employees were more likely to stop breastfeeding sooner than non-working mothers, it emerged that mothers who were self-employed and non-working mothers breastfed for similar durations. The most obvious explanation behind this finding is that self-employed mothers are more likely to work from home, where it is easier for them to juggle between breastfeeding and work-related tasks.

As for employment leave, the results from the current study indicate that delaying the return to work facilitates prolonged breastfeeding. This applies to all mothers regardless of their education, occupation and household income. The risk of stopping to breastfeed earlier is greater if mothers return to work when the child is younger. This may be explained by the fact that as infants age they will all, whether breasted or not, be more likely to be feeding on a mixed diet. Thus, even among exclusively breastfed babies, breast milk may take a more secondary role in feeding as solid foods are gradually introduced, and this reduced level of breastfeeding would be easier to maintain even after returning to work. On the contrary, babies who feed on formula milk at a young age often reject subsequent breast milk altogether (Lindberg, 1996; Roe et al., 1999). Thus, a mother returning to work when the child is very young may struggle to maintain prolonged breastfeeding, even if only as a complementary form of feeding the child. These findings, now also published in a peer-reviewed journal (Skafida 2011), resonate with extensive literature grounded in social theory which points to the conflicting demands that women face in juggling work and motherhood (Blum, 1993; Lindberg, 1996).

Reflections on Social Policy

Employment Policy and Infant Nutrition

Starting with more specific findings regarding the relationship between maternity leave and breastfeeding duration, the results indicate that delaying the return to work is linked to longer breastfeeding durations for mothers. However, after the first 6 weeks of Statutory Maternity Pay, the relatively ungenerous flat rate income of £124.88 is likely to leave mothers and families reliant on savings or on the wage of a partner, where applicable, in order to maintain their standard of living. Returning to work is likely to be a more lucrative and realistic option for many mothers (Rubery, 2008). The proposal recently raised by the European Parliament to offer a minimum of 20 weeks paid maternity leave may promote prolonged breastfeeding among mothers in Europe (European Parliament Press Release 6/10/2010), assuming, of course, that it does not backfire by making young women less employable in the first place.

However, in the UK, maternity leave is fairly generous in length. It is the flat rate maternity pay which is relatively ungenerous, and at £124.88/week, likely to result in mothers opting for an early return to work (Rubery, 2008). A more generous maternity leave scheme, such as the Swedish one which pays 80% of the mother’s average wage for the first 13 months of leave, would perhaps be more likely to promote the take-up of longer leave, potentially having a trickle-down effect on breastfeeding duration. Ultimately, further coordination between the targets of infant nutrition policy and the provisions made for mothers in employment policy may be appropriate.

Many women, however, do want to return to work, and they should be able to continue to work without feeling that this comes at a cost of any aspirations they may have as mothers. The data show that mothers who are self-employed and by default working under more flexible conditions are able to maintain prolonged breastfeeding, and are not worse-off than those not working at all. From a spatial and practical perspective, breastfeeding quite simply requires the mother and infant to be in close proximity throughout the working day, and this can easily be achieved if self-employed mothers are working from home. It would therefore be important to explore how facilitating this ‘proximity’ between mother and child could be achieved for mothers who are employees in larger firms and working in traditionally less-flexible working environments. Enabling more mothers working as employees to work from home, would be an important improvement, especially in employment sectors where working from home is unlikely to hamper employment-productivity.

More work-based crèches and established maternal rights to more flexible working hours across all forms of employment could be a way of providing mothers with more time and resources to juggle the demands of both breastfeeding and work (Cooklin et al., 2008; Roe et al., 1999). While such family-friendly policies have been evolving for some time in the UK, progress remains slow (Dex and Smith, 2002).

From a social perspective, however, the socially constructed idea that motherhood and breastfeeding are a private affair and not appropriate in the public place of employment are probably a bigger obstacle to reconciling work and breastfeeding than the actual practical and spatial obstacles would be. As a result, many mothers feel that the ‘choice’ between work and motherhood, is more of a ‘non-decision’ rather than a choice as such.

Social Inequalities in Child Nutrition

As for broader findings regarding the importance of maternal human capital in determining children's nutritional outcomes, it seems public health initiatives often overlook the unequal distribution of health in society. Information-based public health initiatives can only ever be of secondary importance when implemented in a societal setting where fundamental inequalities in education, occupational opportunities and income shape most aspects of the lives of adults and their children, including nutrition and health. Policy could focus more on addressing these underlying root causes of health inequalities in families and children, possibly by investing in a more comprehensive welfare system that could promote a more equal distribution of, and access to, human capital in society.

In light of the above, policy initiatives which rely on 'educating' parents regarding the importance of healthy eating do not address the underlying structural constraints which make some groups of parents less likely to apply knowledge about healthy eating, even when being fully aware about the benefits of healthier food options. Education based policies which aim to change the ways families and children eat are essentially trying to tackle the symptoms of a broader problem found in the differential distribution of human capital which shapes those food choices in the first place. A failure for policy to reach parents and families most at risk of nutrition related illnesses, is a missed opportunity to 'alter' the predisposition towards nutrition-related illnesses which young children, particularly from disadvantaged backgrounds, may inherit in their infancy and early childhood. Addressing the underlying social stratification in society would be a way to address the most fundamental cause of the existing health and nutritional inequalities among children in Scotland – and that would be a rather ambitious goal.

CHAPTER 6
Wise Advice: Maternal human capital and use of formal and informal advice on healthy eating

Introduction

The preceding chapter focused on the relationship between maternal human capital and children's nutrition, concluding that there is a statistically significant association between maternal human capital and the nutritional habits of children from birth through the early years. More importantly, of the three indicators of human capital used in the analysis, it was maternal education which was the most useful dimension in capturing differences in children's nutrition. This chapter aims to explore whether maternal human capital explains maternal use of advice on healthy eating and differences in maternal attitudes towards the involvement of health professionals in aspects of childrearing and child nutrition. It will pay particular attention to the different sources of information which parents use for advice on healthy eating, distinguishing between 'formal' sources, such as health professionals, and 'informal' sources of advice, such as family and friends, other mothers, the internet, books and magazines, and TV and radio.

Social Policy

The review of nutrition-related policy in Scotland indicated that many policy initiatives aimed, in great part, to educate and inform parents about healthy eating (Lang et al., 2009). For example, the Infant Nutrition Strategy announced in the *Healthy Eating, Active Living* action plan (Scottish Government, 2008b) which is currently in place aims to ensure that all pregnant women and mothers have access to appropriate advice regarding their own nutrition and the nutrition of their children. To a large extent, public health policy has embraced and reproduced a medicalised approach to feeding and rearing children. Professional medical knowledge has gained authority on aspects of childrearing, including decisions about infant and child feeding, which would traditionally have been perceived as matters of private concern.

Current policy initiatives, however, do not often recognise that fathers and mothers have to process potentially conflicting information given by medical professionals on the one hand, and by family or friends on the other. Even in cases where a conflict of existing information on child nutrition is acknowledged, it is unclear under what rationale parents should opt for the 'official' line of advice as opposed to following maternal instinct or experiential advice 'inherited' through the family. To illustrate with an extract from the Food Standards Agency *Eat Well, Be Well* online resource on healthy eating, a section addressing maternal concerns about babies' nutrition starts out as follows: *"Confused by conflicting information on how to feed your baby? Check out our practical advice on [...]"*. The resource goes on to suggest that should a parent not wish to follow the recommendations laid out, they are advised to *"talk to [their] health visitor or GP first"*. Ultimately, little is known regarding how such formal advice on child nutrition is used. This chapter aims to shed some light on these issues. A comprehensive overview of the policy developments relevant to this research are covered in more depth in chapter 2.

Empirical Research Literature

A full overview of the empirical research literature reviewed for the purpose of this research can be found in chapter 1. In summary, the literature suggested that parents use a variety of resources in making decisions related to feeding and raising children (Clarke and Gross, 2004; Neighbors and Jackson, 1984; Nicolson 2010; Savage et al., 1998). Recently published qualitative research suggested that mothers who had given birth in the 1970's were primarily reliant on advice from other family members in contrast to those giving birth after year 2000 who had to also deal with additional information from doctors, midwives, books, magazines and the internet (Nicolson, 2010). Nevertheless, the study found that even contemporary mothers are more likely to perceive advice from family as superior to advice from medical professionals. Evidence on maternal decisions regarding weaning suggested that parents who used advice on weaning from health professionals were less likely to wean prematurely (Bolling et al., 2007), while descriptive statistics based on GUS data showed that parents who knew more about healthy eating were more likely to feed their children healthier foods (Marryat et al., 2009).

The extent to which parents feel there is a need to look for advice on healthy eating is likely to be linked to the extent to which parents perceive poor nutrition as a potential risk for subsequent poor health. Some research has shown that parents may be unaware of the health risks associated with the frequent consumption of some foods, and they may also be unaware of what an overweight child looks like (Carnell et al., 2005; Jeffery et al., 2005). More importantly, parents often have altogether different concerns and may worry that their children are not eating enough, rather eating too much, or they may prioritise more immediate and non food-related health risks (Backett-Milburn et al., 2006).

Social Theory

Various scholars have argued that a heightened sense of *risk* has coloured the way we perceive childhood, and child nutrition is increasingly portrayed as fraught with risk. This socially constructed phenomenon may have paved the way for an increased involvement of medical professionals in regulating and monitoring child nutrition (Blum, 1993; Fildes, 1986; Maher, 1992b; Mennell et al., 1992; Murphey, 2000; Stainton Rogers, 2001). Thus, the fact that parents perceive the feeding of children as potentially fraught with *risk* goes some way in explaining the expansion of public health policy in areas such as breastfeeding, weaning and early childhood nutrition. In line with Foucault's concept of power-knowledge (Foucault, 1980), the risk-culture and medicalisation of child nutrition has legitimated the promotion and facilitated the social acceptance of disciplinary educational policy initiatives aiming to optimise health in the population. It is proposed that only by applying evidence based medical *knowledge* about nutrition and health will individuals have the *power* to become healthy individuals. This has resulted in the responsibilisation of parents in taking care of their own and their children's health (Garland, 1996; Murphey, 2000).

However, different social groups respond to this increased involvement of medical professionals in childrearing in different ways. Bourdieu and Passeron suggest that those with more cultural capital are more likely to welcome the intervention of health professionals in aspects of childrearing than parents from less advantaged backgrounds (Bourdieu and Passeron, 1977). Societal groups with more capital are more likely to welcome the advice of health professionals on health optimising behaviours, because they cultivate a desire to pursue optimal health. By adopting preventative health behaviours, and cultivating a 'taste' for healthy living and healthy eating, these societal groups are able to translate their economic and cultural capital into physical capital, investing time and resources in the production and maintenance of health body projects (Bourdieu and Passeron, 1977; Giddens, 1991).

While Bourdieu stressed the influence of economic and cultural capital in determining individual's health behaviours and their perceptions of risk and attitudes to health professionals, Bourdieu did not focus extensively on the importance of education in shaping such capital. This contrasts with the concept of human capital introduced by Becker (1993) in economic theory which highlighted educational qualifications as the central element of human capital. The results presented in this chapter provide an insight of the relative influence that different types of capital have on how parents perceive and use different sources of health advice. A more elaborate outline of this abbreviated theoretical framework can be found in chapter 3, and this informed the analysis and interpretation of the results presented in this chapter.

Analysis

Research Question

This chapter aims to focus on the extent to which maternal human capital predicts what sources of advice mothers use for information on healthy eating and maternal attitudes towards the involvement of health professionals in aspects of childrearing and child nutrition. It will focus specifically on the differential use of healthy eating advice provided through the health service apparatus, which will be referred to as 'formal' advice, and healthy eating advice provided by family and friends, as well as other sources, which will be referred to as 'informal' sources of advice. A more detailed description of the distinction between formal and informal sources of advice has been elaborated in the chapter 1, page 20, and in chapter 4, page 135.

Q.2 Does maternal human capital explain differences in maternal attitudes towards the involvement of health professionals in aspects of childrearing and child nutrition?

It is hypothesised that maternal human capital influences the ways in which mothers perceive and respond to the involvement of health professionals in aspects of childrearing and child nutrition. The first part of this chapter looks at maternal use of, and attitudes towards parenting and nutrition advice provided by health professionals. The second part of the chapter looks at other sources of advice mothers use for information on healthy eating, focusing primarily on what are referred to as 'informal' sources of advice, including family, friends and other mothers.

Binary Logistic Regression

The analysis in this chapter was based on binary logistic regression models [An overview of the method and the post-estimation statistics used was outlined in chapter 4, page 147].

Human Capital and Support from Health Professionals

Equation 7 below formulates the layout of a regression model used to explore the extent to which maternal human capital predicts whether mothers had used information on healthy eating overall (*HEInfo*), irrespective of what sources of information mothers had used. The three indicators for human capital used in the analysis were maternal occupational status, maternal educational qualifications achieved, and household income, consistent with the analytical approach adopted in chapter 5. This part of the analysis is meant to provide a general overview of maternal use of healthy eating information.

Equation 8 formulates the composition of the final regression models used to explore the extent to which maternal human capital explains differences in maternal perceptions towards the involvement of health professionals in aspects of child nutrition and childrearing. Three different dependent variables were used to capture the concept of maternal attitudes towards health professional intervention. In turn, three separate regression models were run for each of these three dependent variables. The variable annotated as *HealthSup(1)* measured whether mothers had used healthy eating advice from health professionals. The second indicator identified mothers who were apprehensive of doctors or social workers interfering in childrearing, annotated as *HealthSup(2)*. Finally the third variable, annotated as *HealthSup(3)* identified mothers who felt that asking for parenting advice from professionals would mean they were bad mothers. The operationalisation of these analytical concepts, and details on how variables were derived are discussed in greater depth in chapter 4, page 133. Both models outlined in equation 7 and 8 use cross-sectional data collected at Sweep 2 and reflect the period during which children were 22 months of age.

Equation 7 Human capital and use of healthy eating information

$$\begin{aligned} &Logit(HEInfo) = a + \beta(Par) + \beta(Edu2) + \beta(NSSEC2) \\ &+ \beta(Income2) + \beta(Age) + \beta(Eth) + \beta(FamStat2) \\ &+ \beta(Age * Par) + \varepsilon \end{aligned} \tag{7}$$

Equation 8 Human capital and health professionals' support to mothers

$$Logit(HealthSup_{1,2,3}) = a + \beta(Par) + \beta(Edu2) + \beta(NSSEC2)$$
$$+ \beta(Income2) + \beta(Age) + \beta(Eth) + \beta(FamStat2)$$
$$+ \beta(Age * Par) + \varepsilon \qquad (8)$$

HEInfo - Sweep 2: If mothers had ever used information on healthy eating

HealthSup(1) - Sweep 2: If mothers had ever used healthy eating information from health professionals

HealthSup(2) - Sweep 2: If mothers agreed with: "If you ask for help or advice on parenting from professionals like doctors or social workers, they start interfering or trying to take over" [derived, see page 135]

HealthSup(3) - Sweep 2: If mothers agreed with: "If other people knew you were getting professional advice or support with parenting, they would probably think you were a bad parent" [derived, see page 135]

Par	- Sweep 1: Child's birth order [derived, see page 130]
Edu2	- Sweep 2: Highest maternal educational qualifications achieved
NSSEC2	- Sweep 2: Maternal occupation classification
Income2	- Sweep 2: Banded household income[11] [derived, see page 128]
Age	- Sweep 1: Mother's age at the birth of the sample child
Eth	- Sweep 1: Mother's ethnicity
FamStat2	- Sweep 2: Family composition, whether a lone-parent family
Age * Par	- Statistically significant interaction effects between maternal age and child's birth order
ε	- error term

Results

Table 19 illustrates the bivariate relationship between selected indicators of human capital and the general use of healthy eating advice by mothers. The results show that most mothers used information on healthy eating (85%)[12], while the true value for

[11] Income data in GUS was only collected in banded form.

[12] Binary logistic regression models may be less efficient when only a small proportion of the sample falls under one of the two outcomes of the dependent variable, as is the case for dependent variables *HEInfo* and *HealthSup*$_2$. This partly explains why the logit models for these two variables had a significant Goodness of Fit statistic, indicating that the regression models did not predict the outcome for these two variables very well (see page 206 for model fit statistics).

the actual population is likely to lie somewhere between 82.9% and 86.2% (i.e. the 95% confidence interval). While mothers from all groups were likely to use it, nonetheless, the use of healthy eating information differed among mothers of different socio-economic and educational backgrounds. Looking specifically at maternal education, the likelihood of having used healthy eating information in general increased as educational qualifications increased. Among mothers with degrees, 91% had used such information, while 76% of those with no qualifications had done so, still representing a great majority. A statistically significant difference was also observed for household income, and for maternal occupational status. In total, 88% of mothers in managerial and professional occupations and 71% of those who had never worked had used healthy eating information. For household income, 88% of those in the highest income group compared to 80% of those in the lowest income group had used healthy eating information. However, the higher end of the confidence interval for the lowest income group (76.6-83.1%) is only marginally lower than the lower end of confidence interval for the highest earners (85.8 – 90.3%). This suggests that the discrepancy between these two income groups could be smaller than it appears to be.

Table 20 shows the results of the multivariate logistic regression looking at the relationship between general use of healthy eating advice and maternal human capital. The pseudo-R^2 value for this model (0.05) suggests that the predictive model is not very good, although this may also be a result of the fact that a vast majority of parents had used healthy eating advice (85%). The results show that, maternal education was the strongest predictor of maternal use of healthy eating information in general. Mothers with no qualifications had half the chance (Odds Ratio 0.513) of using any healthy eating information compared to mothers with degrees. Only one category was statistically significant for maternal NS-SEC, and compared to mothers in managerial and professional occupations, mothers who had never worked had approximately half the chance (OR 0.550) of using information on healthy eating. The results suggest that mothers who were older at birth and who already had previous children had a cumulatively smaller chance of using healthy eating information (Odds Ratio 0.961).

Table 19 Descriptive analysis - Human capital and use of healthy eating information

(adjusted %)	SW2- % Used Info on Healthy Eating [95% CI] N:4367		P value
All mothers	84.6	[82.9-86.2]	
Sample child's birth order			≤0.001
Subsequent birth	82	[79.6-84.2]	
First birth	87.3	[85.5-89.0]	
Mothers Education (SW2)			≤0.001
Degree or equivalent	90.5	[88.8-92.0]	
Vocational qual|s below degree	85.2	[83.0-87.1]	
Higher grade or equivalent	85.1	[81.0-88.5]	
Standard grade or equivalent	79.4	[74.8-83.3]	
No qualifications	76.3	[71.2-80.7]	
Mother's NS-SEC (SW2)			≤0.001
Managerial and professional	88.3	[86.2-90.2]	
Intermediate	86.8	[84.4-88.9]	
Small employers and & self-employed	87.4	[82.9-90.9]	
Lower supervisory and technical	81.8	[76.4-86.2]	
Semi-routine and routine	81.3	[78.2-84.0]	
Never worked	70.6	[61.5-78.3]	
Annual household income – Quartiles (SW2)			≤0.001
Up to £14,999	80.1	[76.6-83.1]	
£15,000 - £25,999	84.2	[81.4-86.5]	
£30,000 – £43,999	88.8	[86.3-90.9]	
£44,000 or more	88.2	[85.8-90.3]	
Missing data	75.6	[69.5-80.8]	
Mother's age at birth [1]			=0.017
Under 20	78.6	[72.1-83.9]	
20 to 29	85.5	[83.3-87.4]	
30 to 40	85.1	[83.3-86.8]	
40 or older	80.4	[71.8-86.9]	
Mother's ethnic background			=0.376
Other	81.9	[74.9-87.3]	
White	84.8	[82.9-86.4]	
Family status (SW2)			≤0.001
Couple household	86.3	[84.7-87.7]	
Single parent household	78.1	[74.3-81.4]	

1.Data filtered for single-births and cases were mother was biological mother of child
2.Percentages are based on weighted data; N values are based on un-weighted data

Table 20 Multivariate logit model – Human capital and use of healthy eating information

Variable reference categories in italics	MODEL 1 - SW2- Used info on Healthy Eating (N:4344)	
	Odds Ratios	**[95% CI]**
Sample child's birth order *(Subsequent birth)*		
First birth	0.540	[0.218,1.337]
Mothers Education (SW2)		
Degree or equivalent		
Vocational qual/s below degree	0.634***	[0.491,0.818]
Higher grade or equivalent	0.622**	[0.437,0.885]
Standard grade or equivalent	0.476***	[0.344,0.658]
No qualifications	0.513***	[0.351,0.750]
Mother's NS-SEC (SW2)		
Managerial and professional		
Intermediate	1.105	[0.823,1.485]
Small employers & self-employed	1.260	[0.818,1.940]
Lower supervisory and technical	0.833	[0.525,1.320]
Semi-routine and routine	0.872	[0.619,1.229]
Never worked	0.550*	[0.324,0.933]
Annual household income – Quartiles (SW2)		
Up to £14,999	0.939	[0.631,1.396]
£15,000 - £25,999	0.951	[0.707,1.280]
£30,000 – £43,999	1.185	[0.847,1.660]
Missing data	0.625*	[0.421,0.926]
£44,000 or more		
Mothers age (in years)	-	
Mother's ethnic background *(Other)*		
White	1.120	[0.676,1.855]
Family status (SW2) *(couple household)*		
Single parent household	0.697**	[0.550,0.882]
Interaction effects		
Mother's age * Birth order = 1st born	0.993	[0.969,1.017]
Mother's age * Birth order = subsequent	0.961***	[0.944,0.978]

1.Data filtered for single-births and cases were mother was biological mother of child

2. 3.Significance levels: * p <0.05, ** p <0.01, *** p<0.001

3.Mod 1: Nag. R2 = 0.05, Goodness of Fit p=0.0258, Standardized Residuals <3, High leverage = 126 obs., Tolerance > 0.200

Table 21 illustrates the bivariate relationship between the indicators of human capital and the three variables capturing maternal attitudes towards the involvement of health professionals in aspects of childrearing and child nutrition. Just under half of all mothers (47%) used healthy eating information from health professionals. A small minority (10%) feared the possibility of health professionals taking over if asked for parenting advice[13], and about 1 in 4 (23%) felt that asking professionals for advice on parenting issues meant one was a bad parent.

A stratified pattern was expected for the maternal use of healthy eating information from health professionals. Based on the theoretical framework informing the analysis it was assumed that mothers from more advantaged backgrounds would be more likely to consult health professionals for advice. However, it was surprising to see that there was little variation and no statistically significant difference in the use of advice from health professionals between mothers of different educational or occupational backgrounds. Only household income predicted statistically significant differences in the use of healthy eating information from health professionals, and mothers living in the lowest income households were more likely to use such advice, with 52% having done so compared to only 44% among those in the highest income households (Table 21)

On the other hand, in line with the theory guiding this analysis, maternal attitudes towards the involvement of health professionals were indeed stratified by indicators of human capital. Table 21 shows that mothers most likely to fear that health professionals 'start interfering or trying to take over' were those with no educational qualifications (26%), those who had never worked (35%), and those in households earning up to £14,999/year (20%). Only a small minority of mothers with degree level education (3%), in managerial and professional jobs (4%), and in the highest income households (3%) feared the interference of health professionals. A similar

[13] Binary logistic regression models may be less efficient when only a small proportion of the sample falls under one of the two outcomes of the dependent variable, as is the case for dependent variables *HEInfo* and *HealthSup*$_2$. This partly explains why the logit models for these two variables had a significant Goodness of Fit statistic, indicating that the regression models did not predict the outcome for these two variables very well (see page 206 for model fit statistics).

trend applied when looking at whether mothers felt that getting professional parenting advice or support would suggest one was a ‘bad parent’. About 1 in 3 mothers with no educational qualifications, 39% of those who had never worked, and 31% of those in the lowest income households agreed with this statement, compared to 15% of mothers with degrees, 17% of mothers in managerial and professional occupations, and 17% of those in the highest earning households (Table 21).

The multivariate analysis results (Table 22) confirmed the trends emerging from the descriptive statistics, but the pseudo-R^2 values suggested that the predictive model was better at predicting parental fear of health professional involvement (0.16) than at predicting parental use of advice from health professionals (0.02) or whether parents felt as bad parents (0.04). Table 22 shows that, maternal education was a stronger predictor of fearing health professionals’ interference and of feeling as a bad parent if asking for advice. Maternal education did *not* capture any statistically significant differences in maternal use of healthy eating information from health professionals. Compared to mothers with degrees, mothers with no qualifications were far more likely to fear the interference of health professionals (OR 3.915), and more likely to feel as bad mothers if asking for parenting advice from professionals (OR 1.612).

There were some statistically significant differences emerging when comparing mothers based on their occupational status and their household income. Compared to mothers in managerial and professional occupations, mothers who had never worked had a about 200% greater chance (OR 2.913) of fearing health professionals interference and a greater chance (OR 1.725) of feeling as bad mothers when asking for professional parenting advice. Maternal occupational status did not statistically significantly predict differences in maternal use of healthy eating information from health professionals (Table 22).

The variable measuring household income was the only indicator of human capital which seemed to capture some statistically significant differences in maternal use of healthy eating information from health professionals. Mothers in the lowest income households were more likely (OR 1.440) to have accessed such information than those in the highest earning households. Those in the lowest income households were also more likely to fear the interference of health professionals (OR 2.810) and to feel as bad mothers if asking for professional parenting advice (OR 1.440) compared to those in the highest earning households (Table 22). This is an important finding, and appears to contradict existing empirical research and social theory regarding the socially differentiated patterns of use of advice from health professionals. However, reflecting on the fact that health professionals in the NHS are encouraged to prioritise their resources on more disadvantaged families and children, the above findings appear to fall into place. While mothers from more disadvantaged backgrounds are less likely to look for advice in general, they are more likely to be actively targeted by health professionals and to be offered and given advice, even if this advice was not initially sought.

The multivariate regression results (Table 22) confirmed that maternal attitudes to the intervention of health professionals is stratified by maternal socio-economic, but primarily by maternal education capital. Maternal education came through as a better indicator for teasing out differences between groups of mothers, compared to maternal occupational status or household income. With regard to other variables controlled for in the model, statistically significant interaction effects were found between the mother's age and the child's birth order for the regression models predicting maternal use of healthy eating advice and maternal use of such advice from health professionals (Table 22). The results suggest that mothers who were older at birth and who already had previous children had a cumulatively smaller chance of using healthy eating information from a health professional (Odds Ratio 0.952). A combination of 'age-related wisdom' together with previous experience of motherhood probably meant that these mothers were less likely to feel a *need* for healthy eating advice in the first place, or may already have used such advice for prior births.

Table 21 Bivariate analysis – Human capital and health professionals' support to mothers

(adjusted %)	**SW2- % HE Information from Health Prof. [95% CI] N:4367**		**P value**	**SW2- %Fear of Doctors/Social workers trying to take over [95%CI] N:4228**		**P value**	**SW2- % Feel bad parents if ask for advice from professionals [95% CI] N:4336**		**P value**
All mothers	46.7	[44.9-48.4]		9.7	[8.6-11.0]		23.2	[21.7-24.9]	
Sample child's birth order			=0.213			=0.616			=0.010
Subsequent birth	45.7	[43.4-48.0]		10	[8.5-11.7]		25.2	[22.9-27.6]	
First birth	47.7	[45.3-50.0]		9.5	[8.0-11.2]		21.3	[19.4-23.3]	
Mothers Education (SW2)			=0.995			≤0.001			≤0.001
Degree or equivalent	46.2	[43.2-49.1]		2.6	[1.8-3.9]		15.3	[12.8-18.1]	
Vocational qual|s below degree	46.6	[43.8-49.5]		8.4	[7.1-10.0]		24.4	[21.9-27.0]	
Higher grade or equivalent	46.5	[40.8-52.4]		7.4	[4.6-11.5]		23.5	[18.8-29.1]	
Standard grade or equivalent	46.7	[42.8-50.6]		15.5	[12.9-18.5]		27.5	[24.0-31.3]	
No qualifications	47.4	[41.3-53.5]		25.7	[21.6-30.2]		33.2	[28.4-38.3]	
Mother's NS-SEC (SW2)			=0.341			≤0.001			≤0.001
Managerial and professional	45.1	[42.5-47.7]		3.8	[2.8-5.0]		17.2	[15.0-19.7]	
Intermediate	45.8	[42.4-49.2]		5.8	[4.1-8.3]		22.3	[19.3-25.5]	
Small employers and & self-employed	44.1	[37.3-51.2]		7.5	[4.8-11.4]		20.7	[16.0-26.3]	
Lower supervisory and technical	49.9	[43.8-55.9]		14.7	[10.4-20.3]		23.9	[18.8-29.8]	
Semi-routine and routine	48	[44.9-51.2]		14.5	[12.0-17.5]		28.7	[26.0-31.5]	
Never worked	51.5	[43.1-59.8]		35.1	[27.5-43.5]		38.7	[30.2-47.9]	
Annual household income – Quartiles (SW2)			≤0.001						
Up to £14,999	52.1	[49.1-55.1]		20.4	[17.7-23.5]		31.6	[28.5-34.8]	
£15,000 - £25,999	45.7	[42.5-49.0]		8.3	[6.5-10.6]		24.8	[21.7-28.2]	
£30,000 – £43,999	45	[41.8-48.2]		4.7	[3.6-6.2]		18.3	[16.1-20.8]	
£44,000 or more	43.6	[40.3-46.9]		2.9	[2.0-4.1]		17	[14.2-20.1]	
Missing data	43.4	[37.3-49.7]		13.1	[9.7-17.6]		23.6	[17.2-31.4]	
Mother's age at birth [1]			≤0.001			≤0.001			≤0.001
Under 20	44.7	[39.5-50.0]		24.6	[18.8-31.4]		29.8	[24.1-36.2]	
20 to 29	51.6	[48.8-54.4]		11.6	[9.6-13.9]		26.1	[23.7-28.6]	
30 to 40	43	[40.8-45.2]		5.8	[4.9-6.8]		19.8	[17.9-21.8]	
40 or older	41.5	[32.6-51.0]		9	[4.7-16.6]		21.9	[15.8-29.4]	
Mother's ethnic background			=0.145			=0.039			=0.374
Other	53	[44.1-61.8]		14.9	[9.8-22.1]		19.9	[13.9-27.8]	
White	46.4	[44.7-48.2]		9.5	[8.4-10.8]		23.3	[21.7-25.0]	
Family status (SW2)			=0.035			≤0.001			≤0.001
Couple household	45.8	[44.0-47.7]		7.3	[6.4-8.5]		21.5	[19.7-23.4]	
Single parent household	49.9	[46.4-53.5]		19.4	[16.1-23.1]		30.3	[26.9-33.9]	

1.Data filtered for single-births and cases were mother was biological mother of child

2.Percentages are based on weighted data; N values are based on un-weighted data

Table 22 Multivariate logit model – Human capital and health professionals' support to mothers

Variable reference categories in italics	MODEL 1 SW2- Info from Health Prof. (N:4344)		MODEL 2 SW2- Fear of Doctors/Social workers trying to take over (N:4208)		MODEL 3 SW2- Feel bad parents if ask for advice from professionals (N:4314)	
	Odds Ratios	**[95% CI]**	**Odds Ratios**	**[95% CI]**	**Odds Ratios**	**[95% CI]**
Sample child's birth order *(Subsequent birth)*						
First birth	0.248***	[0.124,0.494]	0.848	[0.650,1.106]	0.762**	[0.632,0.919]
Mothers Education (SW2)						
Degree or equivalent						
Vocational qual/s below degree	0.884	[0.754,1.037]	1.913**	[1.176,3.113]	1.398*	[1.063,1.839]
Higher grade or equivalent	0.880	[0.685,1.131]	1.567	[0.804,3.056]	1.350	[0.921,1.979]
Standard grade or equivalent	0.811	[0.643,1.025]	2.596***	[1.636,4.119]	1.380*	[1.010,1.887]
No qualifications	0.819	[0.585,1.146]	3.915***	[2.318,6.613]	1.612**	[1.156,2.248]
Mother's NS-SEC (SW2)						
Managerial and professional						
Intermediate	1.013	[0.827,1.241]	0.897	[0.534,1.508]	1.069	[0.809,1.413]
Small employers & self-employed	0.961	[0.715,1.292]	1.249	[0.681,2.291]	0.918	[0.623,1.354]
Lower supervisory and technical	1.116	[0.811,1.534]	1.725*	[1.038,2.868]	0.998	[0.695,1.433]
Semi-routine and routine	0.988	[0.790,1.237]	1.365	[0.869,2.144]	1.208	[0.937,1.556]
Never worked	1.044	[0.676,1.612]	2.913***	[1.631,5.203]	1.725*	[1.062,2.801]
Annual household income – Quartiles (SW2)						
Up to £14,999	1.381**	[1.092,1.747]	2.810***	[1.743,4.530]	1.440*	[1.017,2.038]
£15,000 - £25,999	1.071	[0.880,1.305]	1.511	[0.944,2.419]	1.198	[0.912,1.575]
£30,000 – £43,999	1.042	[0.864,1.256]	1.225	[0.775,1.938]	0.947	[0.725,1.236]
Missing data	0.972	[0.722,1.311]	2.022**	[1.241,3.294]	1.117	[0.718,1.740]
£44,000 or more						
Mothers age (in years)	-		0.968**	[0.944,0.992]	0.984	[0.968,1.000]
Mother's ethnic background *(Other)*						
White	0.845	[0.572,1.248]	0.833	[0.459,1.510]	1.395	[0.852,2.284]
Family status (SW2) *(couple household)*						
Single parent household	0.955	[0.777,1.174]	1.060	[0.774,1.450]	1.000	[0.775,1.290]
Interaction effects						
Mother's age * Birth order = 1st born	0.998	[0.979,1.017]	-		-	
Mother's age * Birth order = subsequent	0.952***	[0.935,0.971]	-		-	

1.Data filtered for single-births and cases were mother was biological mother of child   2.Significance levels: * p <0.05, ** p <0.01, *** p<0.001

3.Mod 1: Nag. R2 = 0.02, Goodness of Fit p=0.2993, Standardized Residuals <3, High leverage = 212 obs., Tolerance > 0.200

4.Mod 2: Nag. R2 = 0.16, Goodness of Fit p=0.0161, Standardized Residuals <3, High leverage = 83 obs., Tolerance > 0.200

5.Mod 3: Nag. R2 = 0.04, Goodness of Fit p=0.1616, Standardized Residuals <3, High leverage = 189 obs., Tolerance > 0.200

Human Capital and Informal Sources of Advice on Healthy Eating

Maternal attitudes towards the involvement of health professionals and maternal use of 'formal' sources of healthy eating advice vary between groups of mothers from different socio-economic and educational backgrounds. However, 'formal' sources of healthy eating information, such as health visitors and GPs, are only some of the sources of information which mothers use in making decisions about infant feeding. Other more 'informal' sources of advice, such as family members or friends, play an important role in influencing maternal feeding decisions. This section explores whether the use of such 'informal' sources of advice varies between different groups of mothers.

Analytical Model

Equation 9 formulates the analytical model used to explore how the use of 'informal' sources of information on healthy eating is influenced by maternal human capital. This model uses cross-sectional data collected at Sweep 2 and reflects the time period when the baby cohort was 22 months of age. *HEadvice* is an umbrella term for 5 different sources of advice used for the analysis (derived, see page 135 for further details). These five sources of advice were used as five separate dependent variables, and identical multivariate regression models were run for each of these 5 dependent variables. To look at the relationship of maternal human capital and use of informal advice, three indicators of human capital, that is maternal education, maternal occupational status, and household income were used in the analysis.

Equation 9 Human capital and general use of sources of advice

$$
\begin{aligned}
&Logit(HEadvice) = a + \beta(Par) + \beta(Edu2) + \beta(NSSEC2) \\
&+ \beta(Income2) + \beta(Age) + \beta(Eth) + \beta(FamStat2) + \varepsilon \qquad (9)
\end{aligned}
$$

HEadvice(1)	- Sweep 2: If parent used healthy eating information from: family or friends [derived, see page 135]
HEadvice(2)	- Sweep 2: If parent used healthy eating information from: other mothers
HEadvice(3)	- Sweep 2: If parent used healthy eating information from: the internet
HEadvice(4)	- Sweep 2: If parent used healthy eating information from: books and magazines
HEadvice(5)	- Sweep 2: If parent used healthy eating information from: TV and radio

Par	- Sweep 1: Child's birth order [derived, see page 130]
Edu2	- Sweep 2: Highest maternal educational qualifications achieved
NSSEC2	- Sweep 2: Maternal occupation classification
Income2	- Sweep 2: Banded household income[14] [derived, see page 128]
Age	- Sweep 1: Mother's age at the birth of the sample child
Eth	- Sweep 1: Mother's ethnicity
FamStat2	- Sweep 2: Family composition, whether a lone-parent family
ε	- error term

The five sources of healthy eating advice explored in the above model will be collectively referred to as 'informal' sources of advice in this chapter. This term means to distinguish between the official, or 'formal', sources of advice provided through the public health policy apparatus, and the 'informal' advice which does not necessarily adhere to official public health recommendations. Clearly, an absolute distinction between what 'formal' and 'informal' sources of advice are is not possible given the nature of the data collected in GUS. As such, healthy eating advice from the 'internet' or 'books and magazines' may very well be capturing 'formal' sources, such as the *Eat Well, Be Well* website. Also, mothers receiving advice from their family, could be receiving 'formal' advice communicated indirectly via other family members. Thus, the actual classification of sources of advice, given the existing data in GUS, leaves room for potential ambiguity.

Other methodological considerations regard the potential ambiguity with variables measuring the use of *both* books *and* magazines, in light of the vast spectrum of literature which might be captured through this term. Since the groups of mothers

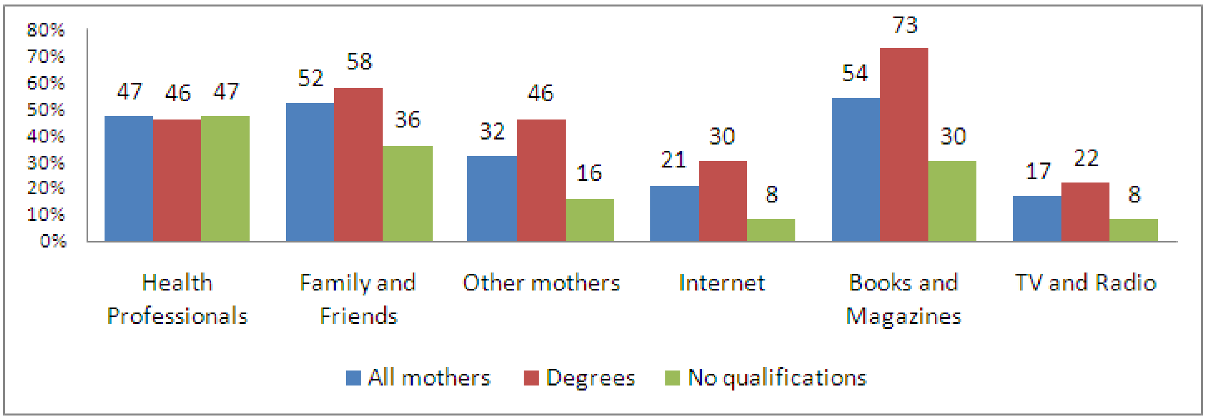
[14] Income data in GUS was only collected in banded form.

who consult mostly magazines may differ from those who use books for healthy eating advice, it may be that an underlying differential pattern of use of books compared to magazines may not be picked up by this survey question.

Results

Figure 12 below illustrates the distribution of maternal use of formal and informal resources on healthy eating among all mothers, and comparatively between mothers with degrees and mothers with no educational qualifications (The table combines data from Table 21 and Table 23). Collectively among all mothers, books and magazines is the most commonly used source of advice (54%), followed closely by family and friends (52%) and then by health professionals (47%). The TV and radio were the least commonly used sources of advice for all mothers (17%). However, as expected, the use of different sources of advice was stratified by indicators of human capital. As was pointed out in the preceding section, there appears to be no statistically significant difference in maternal use of advice from health professionals between mothers with different educational backgrounds. However, mothers with degrees were overall more likely to use all of the other five informal sources of healthy eating advice. Mothers with degrees were most likely to rely on books and magazines (73%) followed by family and friends (58%). On the other hand, mothers with no qualifications were most likely to use advice from health professionals (47%), followed again by family and friends (36%). Very few mothers with no qualifications actually used the internet (8%) or the TV and radio (8%) for advice.

Figure 12 Use of formal and informal advice on healthy eating by maternal education



There is a point worth noting regarding these different sources of information. Some sources entail a more proactive approach by mothers in looking for advice on healthy eating, such as using the internet or using books and magazines. Using advice from these sources would typically be a result of mothers seeking for advice from these sources. On the other hand, advice from family, friends and other mothers can be offered even when such advice is not actively sought for by mothers. Clearly – this is particularly the case with health professionals, whose job description it is to provide mothers with support and advice, even if this is not sought for. It could be speculated that mothers act differently upon advice which they have actively sought for themselves, compared to advice they may have been given without having sought for it, and this may have implications for the interpretation of subsequent results.

A correlation matrix looking at the relationships between using different forms of advice showed that there were statistically significant correlations between most sources of advice. But the strongest links were between using advice from other mothers and advice from family and friends, (0.359, $p \leq 0.001$). On the other hand, using the internet and using books and magazines were also strongly correlated (0.263, $p \leq 0.001$). This may suggest that some mothers are more proactive in looking for advice on healthy eating while other mothers may be willing to use advice offered from trusted individuals, whether such advice was asked for or not. Finally, perhaps literacy also has a role to play, and maybe some mothers are more comfortable with written resources for healthy eating advice while others are more comfortable with verbal methods of communication.

Table 23 shows that patterns of use to informal sources of healthy eating advice were statistically significantly stratified by maternal education, maternal occupational-status, and household income. Mothers with degrees, those in managerial and professional occupations and those in the highest earning households, were those *most* likely to use any of the five sources of healthy eating information explored in the analysis. The relationship between maternal education and use of informal sources of advice has already been discussed in relation to Figure 12. The results in Table 23 also shows that 67% of mothers in managerial and professional occupations used books and magazines for advice, compared to 24% of non-working mothers.

The results in Table 23 show that older mothers were generally more likely to use informal sources of healthy eating information, but this was not the case when looking at information from family or friends. For example, 53% of mothers aged under 20 at the time of birth used healthy eating information from family or friends, while 37% of those aged 40 or over did so. This could be because younger mothers are more likely to be under greater supervision from their own mothers during childrearing, and less likely to have peers going through motherhood at the same time.

The results from the multivariate logistic regression models indicated that the use of informal sources of advice on healthy eating varies based on mothers' educational and occupational backgrounds, and less so on their household income (Table 24). The pseudo-R^2 values suggested that this model was best at predicting maternal use of books and magazines (0.13) and not as good for predicting use of other sources of advice (R^2=0.04-0.09). Maternal education is the most useful indicator of a stratified use of informal healthy eating advice. Mothers with no educational qualifications were less likely to use any of the above mentioned sources of advice compared to mothers with degrees (Odds Ratios ranging from 0.555-0.298). Overall, maternal education seemed to be slightly less useful in predicting the use of advice from family or friends. Only the group of mothers with no qualifications differed statistically significantly in their use of advice from family or friends compared to mothers with degrees (OR 0.555).

On the other hand, maternal occupational status was fairly useful in predicting differences in the use of information from some sources of advice, controlling for other confounders in the model. Those in routine occupations were less likely to use information from family and friends (OR 0.683), other mothers (OR 0.560), the internet (OR 0.589), and books and magazines (OR 0.575), than those in managerial and professional occupations.

Table 24 also pointed to some interesting results with regard to family composition. Controlling for all confounders in the model, single mothers were less likely to use information from family and friends (OR 0.712). Perhaps this is because single mothers are less likely to have peers with experience of child rearing. Single mothers, however, are more likely to be living with their own parents, particularly if they are under 20 years of age at the time of the child's birth (Anderson et al., 2007). Thus, lone parents might be more likely to benefit from in-house advice from their own parents, and simultaneously be less well-networked with other coetaneous parents.

Overall, the results suggest that more disadvantaged mothers are less likely to use advice on healthy eating which comes in written form, as in advice from books and magazines. Considering that a lot of NHS resources aimed at supporting mothers come in written form (like the *Getting Off to a Good Start* booklet), this is a point of particular policy interest which will be discussed later in this chapter.

Table 23 Bivariate analysis – Human capital and use of informal healthy eating advice

(adjusted %) Used Eating info from:	SW2- Family or Friends [95% CI] N: 4368		P value	SW2- Other mothers [95% CI] N: 4368		P value	SW2- Internet [95% CI] N: 4368		P value	SW2- Books & magazines [95% CI] N: 4368		P value	SW2- TV & radio [95% CI] N: 4368		P value
All mothers	52.1	[50.3-53.9]		31.6	[29.7-33.6]		20.6	[19.4-21.8]		53.8	[51.6-56.1]		16.5	[15.3-17.9]	
Sample child's birth order			=0.010			≤0.001			=0.029			=0.019			=0.002
Subsequent birth	45.2	[42.6-47.8]		27.7	[25.5-30.1]		19.3	[17.8-20.8]		52	[49.2-54.7]		18.4	[16.5-20.6]	
First birth	59.1	[56.9-61.4]		35.6	[33.2-38.1]		21.9	[20.0-23.9]		55.7	[52.9-58.5]		14.6	[13.2-16.1]	
Mothers Education (SW2)			≤0.001			≤0.001			≤0.001			≤0.001			≤0.001
Degree or equivalent	58.3	[55.3-61.3]		46.2	[42.7-49.8]		29.7	[27.3-32.3]		72.8	[70.2-75.3]		22.4	[20.4-24.6]	
Vocational qual|s below degree	52.6	[49.9-55.3]		30.6	[28.5-32.9]		20.7	[18.7-22.8]		54.8	[51.8-57.8]		17.8	[15.7-20.0]	
Higher grade or equivalent	56.5	[51.0-61.9]		31.6	[26.6-36.9]		23.2	[18.4-28.7]		52.8	[47.3-58.1]		13.1	[10.1-16.8]	
Standard grade or equivalent	48.8	[44.3-53.2]		21.4	[18.0-25.1]		12.8	[10.5-15.5]		38.1	[34.2-42.1]		11.7	[9.4-14.4]	
No qualifications	36	[31.3-40.9]		15.8	[12.3-19.9]		7.6	[5.4-10.7]		29.2	[24.9-33.9]		8	[5.1-12.3]	
Mother's NS-SEC (SW2)			≤0.001			≤0.001			≤0.001			≤0.001			≤0.001
Managerial and professional	57.5	[55.0-59.9]		41.9	[38.9-45.1]		27.2	[25.1-29.4]		66.7	[63.4-69.7]		21	[18.8-23.4]	
Intermediate	53.9	[50.2-57.7]		32	[28.5-35.8]		23.5	[21.0-26.2]		58	[54.4-61.4]		16.6	[14.2-19.4]	
Small employers and & self-employed	53.1	[46.6-59.5]		32.6	[26.7-39.1]		23.8	[18.7-29.8]		57.4	[49.8-64.7]		16.8	[12.8-21.7]	
Lower supervisory and technical	50.6	[43.7-57.4]		28.8	[23.6-34.6]		17.1	[12.9-22.4]		47.3	[40.1-54.6]		16.8	[12.2-22.6]	
Semi-routine and routine	47.3	[44.1-50.5]		23.1	[20.9-25.5]		13.2	[11.4-15.2]		41.9	[38.5-45.4]		13.2	[11.2-15.4]	
Never worked	36.6	[30.1-43.7]		11.8	[8.1-17.0]		8.3	[5.0-13.6]		23.7	[17.5-31.2]		4.5	[2.2-9.1]	
Annual household income – Quartiles (SW2)			≤0.001			≤0.001			≤0.001			≤0.001			≤0.001
Up to £14,999	47.2	[44.2-50.3]		20.6	[18.3-23.1]		12.1	[10.3-14.3]		37	[33.8-40.4]		10.8	[9.2-12.6]	
£15,000 - £25,999	53.6	[49.9-57.2]		27.5	[24.9-30.2]		20.6	[18.0-23.6]		50.2	[46.8-53.7]		17.7	[14.9-20.8]	
£30,000 – £43,999	55	[52.1-57.9]		37.6	[34.6-40.7]		24.7	[22.3-27.3]		62.3	[59.3-65.3]		18.8	[16.9-20.9]	
£44,000 or more	56.2	[52.5-59.9]		45.5	[41.1-50.1]		28.3	[25.3-31.5]		71.3	[68.5-74.0]		21.3	[18.8-24.0]	
Missing data	41	[34.8-47.5]		22.2	[17.8-27.3]		13.5	[10.2-17.7]		45.1	[38.8-51.6]		11.9	[8.7-16.0]	
Mother's age at birth [1]			=0.017			≤0.001			≤0.001			≤0.001			≤0.001
Under 20	53	[46.4-59.4]		17.4	[13.4-22.2]		8.7	[5.8-13.0]		33.8	[27.4-40.9]		7.4	[5.0-10.8]	
20 to 29	53.9	[51.0-56.8]		27.9	[25.5-30.4]		20	[18.1-22.1]		49.6	[46.8-52.5]		14.4	[12.7-16.3]	
30 to 40	51.2	[48.9-53.6]		37.2	[34.8-39.7]		23.1	[21.6-24.7]		60.6	[58.0-63.1]		19.9	[18.0-21.9]	
40 or older	38.6	[31.0-46.9]		33.2	[25.6-41.9]		19.4	[13.7-26.6]		57.1	[47.5-66.2]		17.1	[11.7-24.2]	
Mother's ethnic background			=0.918			=0.058			=0.322			=0.005			=0.304
Other	51.7	[44.2-59.2]		31.9	[29.9-33.9]		20.7	[19.4-22.0]		43	[35.8-50.4]		14.3	[10.6-18.9]	
White	52.1	[50.3-54.0]		24.7	[18.4-32.3]		17.1	[11.5-24.5]		54.3	[51.9-56.6]		16.6	[15.3-18.0]	
Family status (SW2)			≤0.001			≤0.001			≤0.001			≤0.001			≤0.001
Couple household	53.8	[51.8-55.9]		34.6	[32.4-36.8]		22.5	[21.3-23.8]		57.9	[55.7-60.1]		18	[16.7-19.4]	
Single parent household	45.1	[41.8-48.4]		19.8	[17.4-22.4]		12.8	[10.5-15.6]		37.5	[34.0-41.2]		10.6	[8.4-13.2]	

1.Data filtered for single-births and cases were mother was biological mother of child

2.Percentages are based on weighted data; N values are based on un-weighted data

Table 24 Multivariate logit model – Human capital and use of informal healthy eating advice

Sources of eating information accessed by parents % *Variable reference categories in italics*	MODEL 1 SW2- Family & friends (N:4344)		MODEL 2 SW2- Other mothers (N:4344)		MODEL 3 SW2- Internet (N:4344)		MODEL 4 SW2- Books & magazines (N:4344)		MODEL 5 SW2- TV & radio (N:4344)	
	Odds Ratios	[95% CI]	Odds Ratios	[95% CI]	Odds Ratios	[95% CI]	Odds Ratios	[95% CI]	Odds Ratios	[95% CI]
Sample child's birth order										
Subsequent birth										
First birth	1.585***	[1.376,1.826]	1.554***	[1.349,1.789]	1.107	[0.949,1.293]	1.197**	[1.048,1.368]	0.772**	[0.646,0.922]
Mothers Education (SW2)										
Degree or equivalent										
Vocational qual/s below degree	0.856	[0.713,1.028]	0.683***	[0.590,0.791]	0.732**	[0.586,0.915]	0.595***	[0.493,0.718]	0.857	[0.695,1.058]
Higher grade or equivalent	0.967	[0.721,1.298]	0.721*	[0.537,0.968]	0.836	[0.618,1.131]	0.549***	[0.426,0.708]	0.609**	[0.431,0.860]
Standard grade or equivalent	0.780	[0.602,1.010]	0.510***	[0.387,0.672]	0.486***	[0.365,0.646]	0.367***	[0.292,0.460]	0.595***	[0.442,0.803]
No qualifications	0.555***	[0.405,0.761]	0.416***	[0.290,0.596]	0.345***	[0.221,0.537]	0.298***	[0.227,0.392]	0.434**	[0.263,0.714]
Mother's NS-SEC (SW2)										
Managerial and professional										
Intermediate	0.993	[0.752,1.313]	0.646**	[0.482,0.865]	0.632**	[0.459,0.870]	0.522***	[0.420,0.648]	0.792	[0.602,1.043]
Small employers & self-employed	1.063	[0.846,1.335]	0.697**	[0.553,0.878]	0.927	[0.719,1.195]	0.665***	[0.533,0.829]	1.086	[0.829,1.424]
Lower supervisory and technical	1.002	[0.834,1.204]	0.873	[0.704,1.082]	0.949	[0.752,1.198]	0.833*	[0.698,0.995]	0.985	[0.805,1.205]
Semi-routine and routine	0.683*	[0.492,0.948]	0.560**	[0.393,0.797]	0.589*	[0.386,0.898]	0.575***	[0.433,0.763]	0.720	[0.485,1.070]
Never worked	0.892	[0.733,1.086]	0.955	[0.770,1.185]	1.051	[0.833,1.327]	1.115	[0.886,1.402]	0.927	[0.717,1.197]
Annual household income – Quartiles (SW2)										
Up to £14,999	0.990	[0.738,1.327]	0.991	[0.728,1.348]	1.127	[0.775,1.638]	1.038	[0.709,1.521]	0.863	[0.606,1.228]
£15,000 - £25,999	0.827	[0.598,1.143]	1.023	[0.734,1.426]	0.819	[0.554,1.211]	0.916	[0.622,1.349]	1.061	[0.692,1.624]
£30,000 – £43,999	0.770**	[0.636,0.932]	0.888	[0.724,1.089]	0.701*	[0.533,0.923]	0.880	[0.703,1.102]	0.889	[0.684,1.155]
Missing data	0.550***	[0.399,0.758]	0.548*	[0.336,0.893]	0.586	[0.326,1.053]	0.543**	[0.354,0.834]	0.383*	[0.184,0.799]
£44,000 or more										
Mothers age (in years)	0.973***	[0.962,0.984]	1.022***	[1.010,1.035]	0.992	[0.978,1.006]	1.014*	[1.001,1.028]	1.017*	[1.000,1.033]
Mother's ethnic background *(Other)*										
White	0.876	[0.614,1.249]	1.236	[0.828,1.846]	1.036	[0.620,1.731]	1.280	[0.853,1.920]	0.980	[0.604,1.590]
Family status (SW2) *(Couple household)*										
Single parent household	0.712**	[0.578,0.877]	0.810	[0.650,1.010]	0.906	[0.699,1.174]	0.906	[0.758,1.082]	0.918	[0.670,1.256]

1.Data filtered for single-births and cases were mother was biological mother of child. Significance levels: * p <0.05, ** p <0.01, *** p<0.001

2.Mod 1: Nag. R2 = 0.05, Goodness of Fit p=0.3522, Standardized Residuals <3, High leverage = 199 obs., Tolerance > 0.200

3.Mod 2: Nag. R2 = 0.09, Goodness of Fit p=0.5180, Standardized Residuals <3, High leverage = 224 obs., Tolerance > 0.200

4.Mod 3: Nag. R2 = 0.06, Goodness of Fit p=0.0667, Standardized Residuals <3, High leverage = 224 obs., Tolerance > 0.200

5.Mod 4: Nag. R2 = 0.13, Goodness of Fit p=0.3213, Standardized Residuals <3, High leverage = 169 obs., Tolerance > 0.200

6.Mod 5: Nag. R2 = 0.04, Goodness of Fit p=0.9033, Standardized Residuals <3, High leverage = 266 obs., Tolerance > 0.200

Discussion

This chapter explored the extent to which maternal human capital, captured by indicators of maternal education and occupational status, as well as household income, are associated with maternal perceptions of medicalised childrearing and the use of formal and informal sources of advice on child nutrition.

Using 'Formal' and 'Informal' Advice on Healthy Eating

The results showed that mothers in the lowest income households were *more*, rather than less, likely to have used information on healthy eating specifically from health professionals compared to mothers in the highest earning households. This result appears to be inconsistent with theories regarding human capital and perceptions of medicalised childrearing. Bourdieu and Passeron (1977) suggest that social groups with more economic and cultural capital are more likely to be aware of nutrition related health *risks* and more likely to welcome the intervention of health professionals in aspects of child nutrition and rearing. On closer inspection, though, in light of contextual information on NHS service provision, this apparently contradictory result can be explained in a way which falls within the theoretical framework which informs this research.

Mothers were asked whether they had used advice from health professionals, defined as either GPs, midwives or health visitors, on issues regarding children's diets or healthy eating in general. In the current set-up of health service provision for families with young children in Scotland, mothers are monitored by a health visitor on a regular basis during the period following child birth. However, following a small number of visits where the child and mother progress with no particular difficulties, health visitors may choose to discontinue their visits if these are deemed 'unnecessary'. As such, mothers who are more likely to struggle with aspects of childrearing are also more likely to stay in prolonged contact with the health visitor and more likely to receive ongoing advice and support from them. These mothers are more likely to be from less advantaged backgrounds in the first place. This particular result may therefore be capturing the extent to which health professionals provided support to mothers, rather than the extent to which mothers proactively sought for advice from them.

Recent shifts within some NHS boards in Scotland have moved towards explicitly limiting the health visitor work force and to targeting disadvantaged families and children ‘at risk’ (Boseley, 2010). By default, health visitors adopt a less interventionist approach with families who manage on their own (Foster, 2008). The particular set-up of health service provision and surveillance in Scotland may somewhat explain why mothers from better-off backgrounds were not more, but *less* likely to report using healthy eating information from health professionals. Ultimately, this is a reflection of the nature of welfare provision in Scotland (and the rest of the UK), where theoretically universal services may at times implicitly manifest elements of ‘targeted’ welfare towards more ‘at risk’ groups.

The results also showed that maternal attitudes towards the involvement of health professionals in aspects of childrearing differed between mothers based on their educational background. Mothers with no educational qualifications were those most likely to fear that health professionals may interfere and try to take over in childrearing, and those most likely to feel that asking for parenting advice from health professionals meant one was a ‘bad parent’. Unsurprisingly, these mothers were also the least likely group to access information on healthy eating in general. However, these results depict a scenario where disadvantaged families are targeted for support by health professionals, but these families are simultaneously apprehensive about the involvement of such professionals in childrearing. The implications of these results for policy are discussed later in the discussion.

Patterns of access to ‘formal’ sources of healthy eating advice varied greatly between different groups of mothers, but formal sources of advice are only a part of the overall spectrum of influences contributing to maternal decisions on feeding. The results showed that mothers use a variety of ‘informal’ sources of advice on healthy eating. Informal sources of advice may or may not provide information which is in accordance with official public health recommendations, and situations where conflicting recommendations are provided from health professionals versus recommendations from family members, may put mothers in a difficult situation (Caplan, 1994). Ultimately, it is difficult to disentangle ‘formal’ and ‘informal’ advice on healthy eating, since mothers may be using advice from family and friends, while this advice was originally given to family and friends by health professionals.

Overall, mothers were equally likely to use advice from family and friends and advice from books and magazines. But the use of advice was heavily influenced by maternal human capital. Mothers with degrees were those most likely to report using all of the informal sources of information explored in the analysis. These mothers were particularly more likely to use books and magazines for advice. In contrast, mothers with no qualifications were most likely to use advice from family and friends, although relatively even more likely to use advice from health professionals.

Generally, indicators of human capital appeared to be slightly less important in predicting maternal use of advice from family and friends, and mothers from more and less advantaged backgrounds were both quite likely to use information ‘inherited’ through the family. This is in itself not a surprising finding. Recently published qualitative research in this field suggested that modern mothers, despite having been relatively accustomed to a medicalised way of childrearing, are still more likely to value advice from family members more than advice from health professionals on aspects of childrearing (Nicolson, 2010). However, advantaged mothers also seem to use non family-originating sources of advice, particularly books and magazines, and this is not the case for disadvantaged mothers. This might suggest that among less advantaged social groups, any existing poor eating habits are more likely to be socially ‘inherited’ from generation to generation and less likely to be counteracted, as mothers from less advantaged backgrounds appear to rely more on family and friends, and less so on external sources of healthy eating advice.

The analysis also revealed that the format in which advice about healthy eating is provided could be of particular importance. The correlation between having used different sources of advice indicated that mothers who used one written source of advice were more likely to use another written source of advice. The same applied to mothers who used verbal and interpersonal advice from family and friends, who were also more likely to use similar advice from other mothers. It could be hypothesised that literacy plays a role in how comfortable some mothers are using written advice on healthy eating, and it was mothers from more advantaged backgrounds who were more likely to use written sources of advice such as books and magazines. This too has implications for current public policy and the provision of parenting support to different groups of mothers.

Reflections on Social Theory

The data shows that parents with more educational and human capital and with more material resources are more likely to have used information on healthy eating from both formal and informal sources of advice, and they are more likely to have a positive view of the intervention of health professionals in rearing children. Also, these mothers may be more pro-active in searching for advice. This was indicated by their greater likelihood in having used sources of information which required the parent to search for advice of their own initiative, such as the internet or books and magazines. On the other hand, mothers from poorer backgrounds seem to have their reservations when being faced with health professionals' involvement in childrearing. This is concerning, especially considering that it is precisely these mothers that health professionals are most likely to target.

These results largely confirm the social theories which point to the importance of human capital in shaping individuals' attitudes to the intervention of medical professionals in aspects of health and nutrition. Human capital which colours how individuals interact with their surroundings plays an important role in shaping how mothers perceive the sense of 'risk' and the increased intervention of health professionals in various aspects of child health and nutrition. The vast body of social theory on perceptions of risk, suggests that it is mothers from more advantaged backgrounds who are more prone to feel the 'social anxiety' surrounding the 'risks' associated with all aspects of childhood. This applies to the risks associated with infant feeding, and eating habits in early childhood (Blum, 1999; Maher, 1992b; Mennell et al., 1992; Murphey, 2000).

Thus, mothers from more advantaged backgrounds have a heighted sense of ‘risk’ and a related heightened sense of ‘food fear’. They are more likely to embrace public health advice on adopting health preventative behaviours, and are more likely to be pro-active in accumulating knowledge about food and health in order to roam through a food landscape potentially fraught with risk. In Foucauldian terms, they are more likely to seek to empower themselves with knowledge about food and healthy eating (Foucault, 1980) and to welcome the intervention of medical professionals as a way of accessing the knowledge on healthy eating which they may offer. Mothers can the apply this knowledge to maximise the potential of their children’s ‘body projects’ (Giddens, 1991).

Reflections on Social Policy

The vast majority of public health initiatives addressing children’s diets and nutrition related illnesses are primarily based on informing and educating parents about health food choices and the detrimental health outcomes of poor diets over time (Lang et al., 2009). The underlying assumption is that if parents are equipped with the appropriate *knowledge* about food and health, they will go on to make the *right* choices for their children. But the findings confirm that parents from better-off backgrounds are both more likely to use information about healthy eating and more likely to have a positive view of health professionals’ involvement in childrearing. Information-based public health initiatives are therefore bound to have a smaller impact on those more at-risk children living in families with less socio-economic and educational resources.

The data suggest that health professionals, including health visitors in post-natal care, are most likely to provide advice on breastfeeding and healthy eating to disadvantaged families. This is in line with recent shifts in service provision which sought for health professionals to focus their attention on more disadvantaged families. Nevertheless, mothers from poorer socio-economic and educational backgrounds seem to be apprehensive of the involvement of health professionals in aspects of childrearing. Also, in situations where advice from family contradicts advice from health professionals, mothers may find it difficult to discard advice from their own family in order to adopt advice delivered through an ‘outsider’ to the family. The scenario emerging from these results indicates that health professionals, regardless of their efforts, may find it difficult building rapport with mothers in disadvantaged families, because these mothers find it difficult to trust health professionals in general. Thus, mothers in disadvantaged backgrounds may be given advice by health professionals, but it is unclear to what extent these mothers are likely to value and apply the advice they are given, if they are uneasy with health professionals intervening in the first place.

Perhaps somewhere along the way public health initiatives addressing child nutrition are either not designed or not implemented in such a way as to win the trust of mothers and families who are most likely to benefit from that support. It is unclear how this problem could be resolved, particularly without first addressing the culturally ingrained distrust which some mothers feel with respect to the increased medicalisation of childrearing. However, these mothers seem to do well with interpersonal forms of advice coming from family and friends or other mothers. Perhaps they could be supported and advised indirectly through interventions targeting grandmothers, or even community interventions which address groups of mothers living in a local area who are going through similar stages of motherhood together.

The results show that advice on healthy eating from health professionals is only a part of the overall spectrum of formal and informal advice which influences mothers. While mothers with more human capital are more likely to consult all of the sources of information mentioned above, the *differences* in patterns of information use were particularly strong for the use of books and magazines, and the internet. Mothers from more advantaged backgrounds are more likely to do ‘DIY’ research, by actively searching the web or consulting books for information on nutrition. The data are unable to reveal what *types* of websites or books and magazines these mothers may have used, and options are likely to include both NHS-approved and other sources of advice. Ultimately, mothers with more human capital appear more prone to actively seek to equip themselves with ‘power knowledge’ which might be used by mothers to make ‘health preventative’ nutritional choices for their children.

This is concerning particularly considering that many of the resources aimed at supporting mothers on issues of parenting and healthy eating come in written format, such as the *Getting Off to a Good Start* booklet, or even the NHS24 online resource. Thus, information-based initiatives and online resources aiming to provide mothers with advice on healthy eating, such as the *Eat Well, Be Well* online resource, are more likely to be used by mothers from better-off backgrounds. While this points to the potential success of relatively cost-effective web-based public health tools, it does highlight the fact that these resources are less likely to reach those mothers and children who are more in need of appropriate guidance and support on issues of child nutrition.

These formats for providing mothers with advice on aspects of childrearing appear to work well for mothers of more advantaged backgrounds. The key issue for policy makers is identifying a format for the provision of support with which mothers from more disadvantaged backgrounds are also comfortable. It may be that there is an underlying barrier of literacy, which makes mothers from less advantaged backgrounds less keen on ‘reading up’ on parenting and healthy eating information. The issue of literacy could also be an obstacle for reaching disadvantaged mothers who may not connect with written sources of advice. Perhaps, online media could be used to provide mothers with advice in visual form, rather than the usual written form.

Ultimately, even the best initiatives which rely on providing mothers with advice on healthy eating may struggle to have a substantial trickle-down effect on children’s diets, because a lack of information on what constitutes healthy eating is not the sole reason why many children have unhealthy diets. Therefore, a comprehensive public health policy portfolio should also include initiatives which go beyond the mere ‘provision of advice’ on healthy eating. These could include more innovative and interactive measures which would be better able to break the barrier of mistrust that some groups of mothers have with regard to health professionals, and also provide mothers with the necessary skills, as well as material and financial resources to be able to put healthy eating advice into practice.

CHAPTER 7
Informed Decisions: Maternal use of healthy eating advice and children's diets

Introduction

The preceding chapter looked at the extent to which maternal human capital explained maternal use of advice on healthy eating and the extent to which maternal human capital predicted differences in attitudes towards the involvement of health professionals in aspects of childrearing and child nutrition. It distinguished between formal sources of advice, such as GPs and health visitors, and informal sources of advice, such as family and friends.

This chapter builds upon the findings presented this far and explores how maternal knowledge of healthy eating, and maternal use of different sources of advice on nutrition are related to children's diets in early childhood. This chapter will first present results focusing on the relationship between infant feeding and maternal use of breastfeeding advice, followed by results looking at the relationship between maternal knowledge of, and use of, healthy eating information and toddlers' diets at 2 years of age. A full discussion of the relevant empirical research literature, relevant policy developments, and the social theory which informs the analysis and discussion this chapter can be found in chapters 1, 2 and 3 respectively, while a brief overview follows below.

Social Policy

As was suggested in chapter 6, the existing policy initiatives aiming to improve the nutritional habits of children in Scotland are primarily focused on providing parents with education, information and advice on issues of healthy eating. The provision of antenatal classes, the distribution of informative resources like the *Getting Off to a Good Start* booklet, and the launch of the *Eat Well*, *Be Well* website, are all measures which fundamentally aim to affect children’s lives via educating these children’s parents (Scottish Government, 2007; Scottish Government, 2008a; Scottish Government, 2008b). This ignores the fact that different groups of parents respond to advice in different ways, and as was shown in the preceding chapter, some parents are clearly apprehensive about letting health professionals interfere in aspects of childrearing. Thus, while health professionals may be able to provide parents with advice, they are not able to influence whether parents put such advice into practice.

Furthermore, the key messages regarding healthy eating which are promoted through public health initiatives in Scotland, and also in the rest of the UK, have focussed primarily on recommendations of what foods children and adults should or should not eat. This can be seen with the widely disseminated advice on eating 5 portions of fruit and vegetables per day, or eating less than 6 grams of salt per day (2 grams for children under five years old). While focusing on what foods to eat is clearly important, less attention has been paid to the skills necessary to be able to transform dietary recommendations into meals, in a way which is sustainable in the context of everyday life. Many parents could benefit not only from being educated on what foods are healthy, but also from learning basic food processing and cooking skills (Department of Health, 2008b; Liquori et al., 1998; Wrieden et al., 2007).

Ultimately, even the most comprehensive information-based initiatives aiming to educate parents on healthy eating will rest on the assumption that a lack of information and knowledge on aspects of child nutrition are a root cause of poor nutritional habits among children in Scotland. But children's diets are affected by several other factors, and the material and structural resources parents need to provide for their children are of key importance. Many parents who are aware of the official public health recommendations regarding healthy eating are unable to put this advice into practice. This may be because they might not have the income necessary to buy healthy foods; they might live in a geographical food desert; or they might lack the kitchen appliances necessary to cook meals from scratch. Therefore, information-based public health policies can only offer a partial solution to improving child nutrition in what is bound to be a far more extensive problem.

Empirical Research Literature

The literature suggested that parents use a variety of resources in making decisions related to feeding and raising children, and this was confirmed in the results presented in the preceding chapter. Research shows that contemporary mothers are more likely to perceive advice from family as superior to advice from medical professionals (Nicolson, 2010). Ultimately, being given advice by either health professionals or family members does not guarantee that this advice will actually be used to influence children's diets (Anderson et al, 2001). Some evidence from administrative sources of data shows that parents who used advice on weaning from health professionals were less likely to wean their infants prematurely (Bolling et al., 2007), indicating that advice from 'formal' sources of public health provision can positively influence maternal practices and decisions regarding infant feeding.

However, previous empirical research in Scotland found that many infants are weaned before 4 months, despite the fact that the most mothers know of the official weaning recommendations advise delaying weaning until after 4 months. Mothers relied on a variety of sources of advice for decisions about weaning, including health visitors and family and friends. However, most mothers relied primarily on their own experiences with the child, and weaned their baby prematurely primarily because they felt the baby was still hungry, or because it could not sleep (Anderson et al., 2001; Savage et al., 1998). The research in this chapter will offer a valuable insight into the extent to which advice from health professionals is linked to children's nutritional habits in infancy and early childhood.

Some parents may be unaware of what constitutes a healthy diet, while others may prefer to follow their own 'instincts' as suggested by the research by Savage et al (1998). However, data from the Department of Health indicate that many parents are aware of the official dietary recommendations but lack confidence and basic food skills when it comes to cooking (Department of Health, 2008b). Mothers, who usually provide for the family's meals, are particularly prone to feeling anxious when cooking meals 'from scratch' and many are uneasy about experimenting with new recipes in case a meal should be rejected by children. A lack of confidence in aspects of cooking and a real lack of basic cooking skills is likely to be a key factor influencing the quality of children's and parents' diets, making families more likely to rely on 'safe options', like processed foods, ready meals and take-ways (Department of Health, 2008b).

Social Theory

Information-driven policy initiatives usually assume that a lack of knowledge about nutrition is to blame for poor nutritional habits among families and children, and by *educating* parents about the risks associated with certain diets, parents will be able to *choose* healthier options for themselves and their family (Carter, 1995). From a Foucauldian point of view, it is through the acquisition of knowledge on issues related to food and health that individuals can be empowered to choose a healthy diet and healthy lifestyle (Foucault, 1980). But there are a number of reasons why relying excessively 'personal choice' would not be recommended as a strategy to combat a national epidemic of nutrition-related illnesses.

Firstly, knowledge comes in different forms, and parents have to process competing and at times conflicting sources of knowledge about nutrition (Caplan, 1994; Davison et al., 1991). As was shown in the chapter 6, parents use a broad spectrum of formal and informal advice on eating, which may or may not include advice provided through public health policy. While support from health professionals may be part of this spectrum of advice used, it has to compete with more ‘informal’ types of advice from other family members and other mothers. So the success of information-based initiatives in improving child health could be compromised in situations where parents are making ‘informed’ food choices, but not necessarily using the information provided by health professionals.

The second problem with a policy strategy which relies on individuals making informed choices regards the problem of resources. The assumption that parents simply require the right knowledge about food in order to make the right choices about food, overlooks the fact that many parents are not in a position to make choices about food in the first place (Delormier et al., 2009). The incidence and extent of food poverty in the UK has been well documented (Dobson et al., 1994; Dowler and Calvert, 1995; Dowler et al., 2001), and many parents who are aware of the official health recommendations regarding child feeding lack the financial and structural resources necessary to be able to ‘make’ these choices in the first place (Delormier et al., 2009; Sen, 1984).

Finally, an increased focus on information-based initiatives in public health policy, there has been a rise in the *responsibilisation* of the individual with regard to self-protection from food-related illnesses (Garland, 1996). By relying on information-based initiatives as a way to address nutrition-related illness the individual comes to be perceived as being primarily responsible for making healthy food choices (Murphey, 2000). This approach simultaneously draws the attention away from the food-environment and food supply which individuals face, and facilitates a less interventionist health policy agenda when it comes to regulating the market and food supply. Regulatory initiatives for the market could improve the currently obesogenic environment which people in Scotland are faced with (Caraher and Cowburn, 2005; Lang et al., 2009; McColl, 2009). This would be a way to ‘responsibilise’ the market, rather than the individual, and would facilitate the general pursuit for, and maintenance of, good health.

Analysis

Research Question

This chapter aims to explore how maternal knowledge of healthy eating, and maternal use of different sources of advice on nutrition are related to the dietary patterns of children in infancy and in toddlerhood. Initially, results focusing on the relationship between infant feeding and maternal use of breastfeeding advice will be presented, followed by results looking at the relationships maternal knowledge of, and use of, healthy eating information and toddlers' diets at 2 years of age. The research question guiding this chapter is outlined below:

Q.3 How does maternal knowledge of, and use of, nutrition advice relate to infants' and toddlers' diets?

Theories about the social construction of 'risk' suggest that a heightened sense of 'food risks' has led to an increased involvement of the medical profession in regulating and moralising food and feeding. Ultimately, parents with a heightened awareness of these 'risks' are also more prone to 'consume' public health advice on child nutrition, and more likely to have children with healthier nutritional habits. It is hypothesised that parents who are confident in their knowledge about healthy eating, and who report using nutrition-related advice from health professionals will have children with healthier eating habits, regardless of the impact that maternal human capital might have on children's nutrition. This part of the chapter explores the relationship between maternal knowledge about, and use of information on child nutrition and a) breastfeeding and the introduction of solids, and b) diet in toddlers age just under 2 years of age.

Binary Logistic Regression

The analysis in this chapter was based on binary logistic regression models (an overview of the method and the post-estimation statistics used was outlined in chapter 4, page 147).

Infant Feeding and Use of Breastfeeding Advice

Analytical Model

Equation 10 formulates the combination of variables used to explain the relationship between maternal use of information on infant feeding and actual infant feeding practice, controlling for other family and child characteristics known to affect infant feeding outcomes (see chapter 4 for further details on the dependent variables). Three different dependent variables were used as indicators of infant feeding, annotated as $InfantNutr_{1,2,3}$ and three separate logistic regression models were run for each of these dependent variables. The regression models were almost identical, with the exception of a variable measuring maternal employment status *EmpStat* which was controlled for only in the regression predicting breastfeeding duration ($InfantNutr_2$).

It was hypothesised that employment status would not affect breastfeeding initiation or the introduction of solids, and this variable was not included in the other two regression models[15]. The independent variables in the models aimed to capture the use of advice, particularly from health professionals, on aspects of breastfeeding. Variables measuring the use of breastfeeding advice from voluntary organisations have been included *(BFNCBT*, *BFvol*) but variables capturing the use of breastfeeding advice from other mothers or family members could not be explored, as this information was not collected in GUS. The explanation of annotated variables outlines which variables are derived, and points to the page in chapter 4 where variable derivations are explained.

[15] Exploratory models confirmed that controlling for known confounders of breastfeeding initiation and the introduction of solids, maternal employment status was not a significant predictor of these nutritional outcomes.

Equation 10 Infant feeding and maternal use of breastfeeding advice

$$
\begin{aligned}
& Logit(InfantNutr_{1,2,3}) = a + \beta(Ante) + \beta(BFadvice) + \beta(BFmid) \\
& + \beta(BFhlthvis) + \beta(BFprof) + \beta(BFGOGS) + \beta(BFNCBT) \\
& + \beta(BFvol) + \beta(Bweight) + \beta(Par) + \beta(Edu) + \beta(Age) \\
& + \beta(Eth) + \beta(FamStat) \\
& [+ \beta(EmpStat)] \\
& + \varepsilon \qquad (10)
\end{aligned}
$$

$InfantNutr_1$	- Sweep 1: If infant was ever breastfed
$InfantNutr_2$	- Sweep 1: If infant was breastfed for 6 weeks or more (excluding those who never breastfed) [derived, see page 118]
$InfantNutr_3$	- Sweep 1: If infant was introduced to solids before turning 4 months old (weaning) [derived, see page 121]
Ante	- Sweep 1: If attended antenatal classes for current or previous birth [derived, see page 138]
BFadvice	- Sweep 1: Parent received breastfeeding help/advice at child’s birth
BFmid	- Sweep 1: Used breastfeeding advice from midwife
BFhlthvis	- Sweep 1: Used breastfeeding advice from health visitor
BFprof	- Sweep 1: Used breastfeeding advice from other health professional
BFGOGS	- Sweep 1: Used breastfeeding advice from Getting Off to a Good Start booklet
BFNCBT	- Sweep 1: Used breastfeeding advice from National Child Birth Trust
BFvol	- Sweep 1: Used breastfeeding advice from other voluntary organisation
Bweight	- Sweep 1: If children were underweight at birth [see page 130]
Par	- Sweep 1: Child’s birth order [derived, see page 130]
Edu	- Sweep 1: Highest maternal educational qualifications achieved
Age	- Sweep 1: Mother’s age at the birth of the sample child
Eth	- Sweep 1: Mother’s ethnicity
FamStat	- Sweep 1: Family composition, whether a lone-parent family
<u>EmpStat</u>	- Sweep 1: Maternal employment status (only statistically significant for breastfeeding duration outcome) [derived, see page 130]
ε	- error term

The analysis of breastfeeding take-up was based on the full sample of mothers, while the analysis of breastfeeding duration focused exclusively on mothers who reported breastfeeding at least once. The outcome referred to as weaning in this chapter (*InfantNutr*$_3$) is an indicator of when solids were first introduced in the infant's diet. As mentioned in chapter 5, having 'introduced' solids does not necessarily imply that infants are no longer feeding on formula or breast-milk. Thus, this variable does not necessarily accurately capture the process of weaning infants from a milk-based diet to a solid foods-based diet. The regression model controls for key variables of interest regarding the use of breastfeeding advice, while the remaining independent variables are included to control for maternal and child characteristics known to influence infant feeding outcomes. These confounders include maternal education which was found in the results presented in chapter 5 to be the most useful indicator of human capital in predicting infant nutrition outcomes.

Variables capturing maternal use of breastfeeding advice were collected retrospectively at 10 months post-partum, and different variables referred to different time points between the pre-pregnancy and post partum period. The data on antenatal classes clearly refers to the ante-natal period, while questions on breastfeeding advice refer to advice received 'at the child's birth'. The variable regarding advice received from midwives refers to the birth and the first days post partum, while the variable on health visitor advice refers to the subsequent period. On the other hand, advice from health professionals, the GOGS resource, and voluntary organisations could have been received at any point in time from the ante-natal period up to 'the time of birth' (as suggested by the question used in the GUS interview). Thus, there is a varied time span to which the questions of advice are referring to.

Recall bias could be particularly problematic when retrospective questions refer to the time before such a life changing event as birth. The fact that such variables which are assumed to have influenced breastfeeding were collected after mothers had breastfed or fomula-fed their infants is also problematic as it could have led to conscious or subconscious retrospective alteration of responses regarding the breastfeeding advice received. Finally, the analysis cannot account for any potential reverse causality between receiving advice and breastfeeding, whereby mothers who intended to breastfeed in the first place actively looked for and asked for advice on breastfeeding. The above caveats need to be taken into consideration in the subsequent interpretation of results.

Results

Table 25 outlines the results of the descriptive bivariate analysis for each independent variable in relation to each of the three infant nutrition outcomes. The table shows that 69% of mothers who attended antenatal classes had breastfed their child at least once, with the 95% confidence interval suggesting that the true value for this group in the population is likely to be between 66.2% and 71.1%. In comparison, only 40% of those who had never attended antenatal classes had breastfed their child at least once. Mothers who attended antenatal classes were also more likely to have breastfed for 6 weeks or longer (73%), compared to those who had not attended any classes (60%). These mothers were also less likely to wean their infants prematurely (13%) compared to mothers not attending classes (23%).

The descriptive analysis showed that having used any of the listed sources of information on breastfeeding meant a mother was more likely to both take-up breastfeeding and to breastfeed for 6 weeks or longer. Similarly, having used any source of information on breastfeeding seemed to be linked to a lower probability of premature weaning. For example, 95% of mothers who received advice from the National Child Birth Trust breastfed at least once, and 88% breastfed for 6 weeks or longer, compared to those who had not used the Trust for advice (60% and 70% respectively).

One surprising finding concerned the use of information on breastfeeding advice from midwives, which seemed to be associated with a *smaller* chance of breastfeeding for 6 weeks or more. In fact, 70% of mothers who had used information on breastfeeding from midwives breastfed for 6 weeks or more, compared to 74% of mothers who had *not* used this source of advice. However, this finding can be explained when considering that mothers who reported using breastfeeding advice from the midwife will have been given such advice after finding it difficult to breastfeed their infant in the first place. If anything, this result indicates that midwives actively aim to support and advise mothers on breastfeeding particularly in circumstances where mothers might struggle to breastfeed during the first 10 days postpartum. In any case, health visitors who support mothers after the initial 10 days have a more influential role on prolonged breastfeeding *duration* than midwives who support mothers only for the first 10 days, and the results from the multivariate regression seem to confirm this theory.

The independent variables in Table 25 were combined in a multivariate binary logistic regression model, of which the results are presented in Table 26. The regression results indicate that, controlling for known predictors of infant nutrition, including maternal education, the use of different sources of breastfeeding advice seemed to be more useful in predicting breastfeeding and, perhaps unsurprisingly, less useful in predicting weaning outcomes.

Breastfeeding Initiation

Table 26 shows that the predictive model was fairly good at predicting breastfeeding initiation, with an R^2 value of 0.32. Controlling for other confounders in the model, mothers who attended antenatal classes were statistically significantly more likely to start breastfeeding (Odds Ratio 2.035) compared to those who had never attended classes, as were those who received breastfeeding advice at the time of the child's birth (OR 1.446). Mothers were also more likely to start breastfeeding if they had received advice from a midwife (OR 1.936), a health professional (OR 1.430), the *Getting Off to a Good Start* booklet (OR 1.421) and far more likely if they had received advice from the National Child Birth Trust (OR 4.193) or other voluntary organisations (OR 2.566). These results are of particular policy importance as they suggest that receiving advice from health professionals and midwives, and written advice on breastfeeding, is positively related to breastfeeding outcomes among all mothers irrespective of their educational background. However, it should be noted that patterns of reverse of causality cannot be identified with the data available. It could be that mothers who intended to breastfeed made sure they attended ante natal classes and used breastfeeding advice from health professionals so as to learn how to breastfeed.

Unsurprisingly, having used breastfeeding advice from a health visitor did not statistically significantly raise the chances of starting breastfeeding. Considering that health visitors commence their care 10 days after child birth, they are unlikely to have any impact on whether a mother *starts* breastfeeding or not. If anything, health visitors are more influential in helping mothers who *do* breastfeed, to breastfeed for a longer period of time, as was found to be the case below.

Breastfeeding Duration

The analysis of breastfeeding duration focused only on the sample of mothers who initiated breastfeeding in the first place (N:3117). Controlling for remaining confounders in the model, having attended antenatal classes was positively associated with breastfeeding duration as well, with those having attended being more likely to have breastfed for at least 6 weeks (Odds Ratio 1.420) compared to non-attendees (Table 26). Having received breastfeeding advice at the time of the child's birth did not predict differences in breastfeeding duration. Among the other sources, having used the *Getting Off to a Good Start* booklet was marginally statistically non-significant, as the 95% confidence interval (OR 0.963-1.829) indicated. While the bivariate analysis suggested that having used information from the midwife was associated with a lower chance of breastfeeding for 6 weeks or more (Table 25), this association was not statistically significant in the multivariate model which controlled for additional confounders. It would be assumed that the health visitor, which takes over post-natal care 10 days post-partum, could be more influential on breastfeeding duration outcomes.

In fact, of all the information sources explored in the model, the only source which seemed to be statistically significantly associated with breastfeeding duration was having used breastfeeding information from the health visitor. Mothers who used information from the health visitor had a about 30% higher chance (OR 1.281) of breastfeeding for 6 weeks or more. As with the findings for breastfeeding initiation, the analysis of breastfeeding duration confirms that health professionals play an important role in supporting mothers to make optimal nutritional choices, during what can at times be a difficult time for mothers. The positive relationship between using help from midwives and health visitors, and breastfeeding initiation and duration applies to all mothers regardless of whether they are from an advantaged or disadvantaged educational background, highlighting the benefit of a universal provision of support for mothers. In terms of improving breastfeeding rates in Scotland through public health policy, there is evidence, albeit not proof, that resources spent on health professionals who support mothers with childrearing may pay off and be justified. The full policy implications of these findings are elaborated in the discussion later in this chapter.

Weaning

The results for weaning suggest that, as for breastfeeding, having attended antenatal classes was positively associated with weaning outcomes, and mothers who attended classes were less likely (OR 0.699) to introduce solids in their infants' diets before they had turned 4 months of age (Table 26). The GUS survey did not include any specific questions regarding whether mothers had used information specifically about introducing solids. It was assumed that such information could have been provided together with information about breastfeeding. However, the analysis shows that only one of the sources of information on breastfeeding was a statistically significant predictor of weaning outcomes. Mothers who had used the *Getting off to a Good Start* booklet were less likely (OR 0.546) to introduce solids before the child had turned 4 months old. The *Getting Off to a Good Start* booklet focuses primarily on breastfeeding, although the booklet does advise mothers that introducing solid foods too early in life may interfere with the child's demand for breast milk.

While the above results are both interesting and important with regard to policy, a crucial point should be made with regard to the relative importance of maternal use of information on breastfeeding advice, and maternal human capital. As the analysis and discussion in chapter 5 indicated, maternal socio-economic and particularly maternal educational characteristics are of central importance in influencing the nutritional outcomes of children in the early years. The results in this chapter point to the statistically significant relationship between maternal use of breastfeeding advice and breastfeeding outcomes for all mothers irrespective of their educational backgrounds. Given that these results are not based on an intervention trial, it is impossible to prove that it is the use of advice which causes positive breastfeeding practices, but the results are encouraging. While using advice on breastfeeding is positively related to breastfeeding outcomes, the maternal educational background is, in relative terms, a far more important predictor of breastfeeding practice than is using advice on breastfeeding. Ultimately, broader policy initiatives which provide families with support and access to opportunities to climb out of poverty are likely to have positive trickle down effects on a number of aspects of health and well-being, including but not limited to increased breastfeeding take-up and duration. The results regarding the remaining variables controlled for in the analysis, including family status and ethnicity, confirm the evidence from existing empirical literature and will not be discussed in further detail in this chapter (see page 16 for evidence from empirical research literature).

Table 25 Bivariate analysis – Infant feeding and maternal use of breastfeeding advice

All mothers (adjusted %)	SW1- % Breastfed at least once [95 %CI] N: 5051		P value	SW1- % breastfed 6 weeks or more[2] [95 %CI] N: 3117		P value	SW1- % weaned before 4 months [95 %CI] N: 4972		P value
All mothers	60.4	[57.8-62.9]		70.5	[68.3-72.6]		15.8	[14.8-16.9]	
Attended antenatal classes for this or previous birth	68.7	[66.2-71.1]	≤0.001	73	[70.9-74.9]	≤0.001	12.8	[11.8-14.0]	≤0.001
Did not attend	39.8	[36.3-43.3]		59.7	[55.1-64.2]		23.2	[21.1-25.5]	
Received breastfeeding help/advice at child's birth	67.6	[65.1-70.0]	≤0.001	69.9	[67.5-72.2]	=0.101	14.1	[13.1-15.3]	≤0.001
Did not receive	39.9	[36.5-43.4]		73.2	[69.5-76.5]		20.6	[18.6-22.8]	
Used help/advice from: midwife	68.4	[65.9-70.8]	≤0.001	69.5	[66.9-71.9]	=0.007	14.1	[12.9-15.3]	≤0.001
Not used	42.9	[39.9-46.1]		74.1	[71.3-76.8]		19.6	[17.9-21.5]	
Used help/advice from: health visitor	69.7	[65.9-73.2]	≤0.001	74.4	[70.6-77.9]	=0.014	14.1	[12.5-15.9]	=0.056
Not used	57.5	[54.9-60.1]		69	[66.5-71.4]		16.3	[15.1-17.7]	
Used help/advice from: other health professional	72.5	[66.8-77.5]	≤0.001	71.3	[66.0-76.0]	=0.736	10.8	[8.1-14.2]	=0.005
Not used	59.2	[56.6-61.7]		70.4	[68.1-72.6]		16.3	[15.2-17.5]	
Used help/advice from: Getting off to a Good Start booklet	79	[73.5-83.7]	≤0.001	79.1	[72.4-84.6]	=0.005	7.6	[4.9-11.6]	≤0.001
Not used	59.1	[56.6-61.6]		69.7	[67.6-71.7]		16.4	[15.3-17.5]	
Used help/advice from: National Child Birth Trust	95	[86.4-98.2]	≤0.001	88.4	[75.7-95.0]	=0.006	6	[2.4-14.2]	=0.021
Not used	59.9	[57.3-62.4]		70.1	[67.9-72.1]		16	[14.9-17.1]	
Used help/advice from: Other voluntary group/org.	86.3	[75.6-92.7]	≤0.001	80.5	[70.5-87.7]	=0.044	6.5	[2.7-14.8]	=0.027
Not used	59.9	[57.3-62.4]		70.2	[68.0-72.3]		16	[15.0-17.1]	

1.Data filtered for single-births and cases were mother was biological mother of child**.** Percentages are based on weighted data; N values are based on un-weighted data
2. Breastfeeding duration percentages based on sample of mothers who initiated breastfeeding.

Table 26 Multivariate logit model - Infant feeding and maternal use of breastfeeding advice

Variable reference categories in italics Baby Cohort	**MODEL 1 – SW1- Breastfed at least once (N:4982)**		**MODEL 2 – SW1- Breastfed 6wks or more** (excluding those who never breastfed) **(N:3071)**		**MODEL 3 – SW1- Weaned before 4 months (N:4903)**	
	Odds Ratios	**[95% CI]**	**Odds Ratios**	**[95% CI]**	**Odds Ratios**	**[95% CI]**
Attended antenatal classes for this or previous birth *(No)*	2.035***	[1.712,2.418]	1.420**	[1.117,1.806]	0.699***	[0.586,0.834]
Received breastfeeding help/advice at child's birth *(No)*	1.446*	[1.083,1.930]	1.139	[0.736,1.763]	1.150	[0.788,1.679]
Received help/advice from: midwife *(No)*	1.936***	[1.533,2.443]	0.718	[0.497,1.039]	0.929	[0.655,1.317]
Received help/advice from: health visitor *(No)*	1.095	[0.909,1.319]	1.281*	[1.010,1.626]	1.041	[0.859,1.261]
Received help/advice from: other health professional *(No)*	1.430*	[1.091,1.875]	0.961	[0.719,1.283]	0.794	[0.543,1.160]
Received help/advice from: Getting off to a Good Start booklet *(No)*	1.421*	[1.068,1.891]	1.327	[0.963,1.829]	0.546*	[0.329,0.907]
Received help/advice from: National Child Birth Trust *(No)*	4.193*	[1.282,13.71]	2.001	[0.904,4.430]	0.847	[0.309,2.318]
Received help/advice from: Other voluntary group/org. *(No)*	2.566*	[1.045,6.300]	1.664	[0.907,3.052]	0.564	[0.220,1.445]
Birth weight *(Birth weight not low)*						
Low birth weight	1.172	[0.873,1.574]	1.272	[0.859,1.883]	0.613**	[0.429,0.875]
Sample child's birth order *(Subsequent birth)*						
First birth	1.132	[0.943,1.358]	0.765**	[0.643,0.910]	0.695***	[0.583,0.828]
Mothers Education (SW1)*(Degree or equivalent)*						
Vocational qual/s below degree	0.304***	[0.248,0.373]	0.440***	[0.349,0.555]	2.784***	[2.187,3.544]
Higher grade or equivalent	0.346***	[0.262,0.458]	0.553***	[0.400,0.765]	2.369***	[1.610,3.485]
Standard grade or equivalent	0.190***	[0.143,0.252]	0.359***	[0.272,0.474]	2.813***	[2.062,3.837]
No qualifications	0.109***	[0.081,0.146]	0.314***	[0.207,0.477]	2.950***	[2.012,4.326]
Mothers age (in years)	1.038***	[1.024,1.053]	1.046***	[1.029,1.063]	0.966***	[0.949,0.983]
Mother's ethnic background *(Other)*						
White	0.241***	[0.139,0.417]	0.713	[0.465,1.095]	2.016*	[1.112,3.653]
Family status (SW1) *(Couple household)*						
Single parent household	0.631***	[0.515,0.772]	0.812	[0.634,1.041]	1.609***	[1.303,1.989]
Employment status during pregnancy *(Not in work)*						
Full-time, employee	-	-	0.770*	[0.596,0.994]	-	-
Full-time, self-employed			0.953	[0.375,2.420]		
Part-time, employee			0.774*	[0.630,0.952]		
Part-time, self-employed			1.542	[0.773,3.074]		

1.Data filtered for single-births and cases were mother was biological mother of child. N values are based on un-weighted data. Significance levels: * p <0.05, ** p <0.01, *** p<0.001
2.Mod 1: Nag. R2 = 0.32, Goodness of Fit p=0.1996, Standardized Residuals <3, High leverage = 75 obs., Tolerance > 0.200
3. Mod 2: Nag. R2 = 0.13, Goodness of Fit p=0.1677, Standardized Residuals <3, High leverage = 45 obs., Tolerance > 0.200
4.Mod 3: Nag. R2 = 0.11, Goodness of Fit p=0.3402, Standardized Residuals <3, High leverage = 47 obs., Tolerance > 0.200

Toddlers' Diets In Relation to Maternal Use of Healthy Eating Advice

Maternal use of formal advice on issues of infant nutrition, and especially maternal attendance at antenatal classes and the use of advice from health professionals, were shown to be positively associated with infant feeding outcomes, irrespective of the effects that other family and child characteristics have on infant nutrition. This section explores whether maternal use of formal and informal advice on healthy eating is positively related to the diets of toddlers, controlling for factors known to influence the eating habits of toddlers. Toddlers are of particular interest for research on child nutrition habits, because public health policy has been relatively silent on this age-group, while empirical research rarely focuses on very young children. However, it is during this period than many fundamental eating habits are learnt in children, stressing the importance of looking at toddlers' diets and the factors which influence them.

Analytical Model

Equation 11 formulates the combination of variables used to predict the relationship between maternal knowledge about healthy eating and maternal use of formal and informal sources of advice on healthy eating with toddlers' diets. Three separate dependent variables ($DietQual_{1,2,3}$) were used for this part of the analysis, which captured babies' diet quality, their vegetable consumption and their snacking habits. An identical logistic regression model was specified and run for each one of the three dependent variables. The analysis aimed to control for indicators of human capital known to influence child nutrition. Since the results in chapter 5 indicated that maternal education (*Edu*) was the most important indicator of human capital in predicting children's nutritional outcomes, this independent variable was controlled for in the regression model. Indicators of maternal NS-SEC and household income were left out of the model since they were shown to be inferior to maternal education. The explanation of annotated variables outlines which variables are derived, and points to the page in chapter 4 where variable derivations are explained.

Equation 11 Babies' diets and maternal use of healthy eating advice

$$\begin{aligned} & Logit(DietQual_{1,2,3}) = a + \beta(Cook) + \beta(HEknow) + \beta(HEInfo) \\ & + \beta(\mathrm{HealhSup1}) + \beta(HEadvice1) + \beta(HEadvice2) \\ & + \beta(HEadvice3) + \beta(HEadvice4) + \beta(HEadvice5) \\ & + \beta(Par) + \beta(Sex) + \beta(Edu2) + \beta(Age) + \beta(Eth) \\ & + \beta(FamStat2) + \beta(Cook * HEknow) + \varepsilon \end{aligned} \qquad (11)$$

$DietQual_1$	- Sweep 2: If child is in poorest category of a relative scale on dietary quality [derived, see page 121]
$DietQual_2$	- Sweep 2: If child eats one or less than one type of vegetable per day [derived, see page 125]
$DietQual_3$	- Sweep 2: If child usually snacks between meals on one or more of the following: crisps, cakes or biscuits, sweets or chocolate [derived, see page 125]
Cook	- Sweep 2: How much parent's cooking knowledge affects what food they give to child [derived, see page 134]
HEknow	- Sweep 2: How much parent knows about healthy eating (HE)
HEinfo	- Sweep 2: If parent used any sources of information on eating
$HealhSup_1$	- Sweep 2: If used HE info from health professionals
$HEadvice_1$	- Sweep 2: If used HE info from family or friends
$HEadvice_2$	- Sweep 2: If used HE info from other mothers
$HEadvice_3$	- Sweep 2: If used HE info from the internet
$HEadvice_4$	- Sweep 2: If used HE info from books and magazines
$HEadvice_5$	- Sweep 2: If used HE info from TV and radio
Par	- Sweep 1: Child's birth order [derived, see page 130]
Sex	- Sweep 1: Child's sex
Edu2	- Sweep 2: Highest maternal educational qualifications achieved
Age	- Sweep 1: Mother's age at the birth of the sample child
Eth	- Sweep 1: Mother's ethnicity
FamStat2	- Sweep 2: Family composition, whether a lone-parent family
Cook*HEknow	- Statistically significant interaction terms between maternal cooking knowledge and how much parent knows about healthy eating
ε	- error term

In the above model, *DietQual* captures some of the eating habits for the Baby Cohort in the GUS survey during the second sweep of data collection, when this cohort was 22 months old. $DietQual_1$ identifies the children whose eating habits placed them in the lowest 25% on a relative dietary quality scale (Further details regarding the derivation of this variable can be found on page 122). *DietQual*$_2$ identifies which children ate only one, or no types of vegetables on a typical day. This variable measuring vegetable consumption was one of the variables used for the construction of the relative dietary quality scale, so to some extent there is a small overlap in the information captured by the first and the second dependent variables in this analysis. However, exploring the factors which predict vegetable consumption in isolation of other eating habits, was considered of particular importance, as vegetables are more likely to be consumed only during meal times, and are less commonly consumed as snacks. As such, it is assumed that vegetable consumption *per se* may provide an important insight into the extent to which mothers promote vegetable consumption during meal times. *DietQual*$_3$ is an indicator of whether children regularly snack on one or more unhealthy foods, namely crisps, cakes or biscuits, sweets or chocolate. This allows the analysis to screen for toddlers' food consumption beyond the meal setting.

Exploratory analysis had indicated that the variable measuring whether maternal cooking knowledge affects what mothers give their child (annotated as *Cook*) was problematic. It was unclear whether mothers who felt their cooking knowledge affected their children's diets a lot, felt this way because they knew a lot about cooking, or because they knew too little. This problem was overcome after including an interaction term between *Cook* and the variable measuring maternal knowledge on healthy eating (*HEknow*), and the related results are discussed later in the chapter.

The above model uses cross-sectional data from Sweep 2 and reflects the time period during which the baby cohort was 22 months old. While the analytical model assumes that using advice on healthy eating influences children's subsequent eating habits, the data cannot rule out reverse casual patterns between the dependent and independent variables. Thus, it is plausible that a different variable, perhaps capturing parenting attitudes and concerns is the causal factor explaining *both* the use of healthy eating advice, and the dietary habits of children.

Results

The results of the initial bivariate analysis are shown in Table 27. These suggest that almost 1 in 3 children (30%) aged 22 months of age in Scotland eat one or no types of vegetables on a typical day, with this value likely to be between 28.4% and 31.9% in the actual population judging by the 95% confidence interval. This is fairly concerning considering how extensively the consumption of vegetables and fruits has been supported in public health policy and public discourse over the last years. A large proportion of children seem not to be eating enough of the foods which are recommended for good health, which raises the question of what other foods children do eat a lot. In fact a concerning statistic from Table 27 is that 3 in every 5 children aged just under 2 years old snack on either crisps, cakes or biscuits, sweets or chocolate between meals on a daily basis. This is alarming, to say the least, because it means children consume sugary foods and refined carbohydrates fairly often, and these foods are likely to constitute a large part of their caloric intake, at the expense of other more nutritious foods. Encouraging children to eat vegetables can be challenging, as most mothers will often report, but the results suggest that there is a need to limit children's consumption of foods which are nutritionally void and detrimental for their health. Ultimately, these general results point to the severity of the current nutritional habits among many of the toddlers growing up in Scotland. As such, initiatives aiming to improve the diets of toddlers in Scotland have a large task at hand, and while small improvements in dietary habits would be welcome, in reality a real dietary overhaul might be necessary to avoid the potential future health implications of such extensively common unhealthy dietary habits.

Table 27 also indicates that mothers who felt that their cooking knowledge affected their child's diet a lot or a fair amount, compared to those who said it affected their child's diet a little or not at all, were statistically significantly less likely to have children in the poorest diet category (24% vs. 30%), and less likely to have children who usually snacked on unhealthy foods (57% vs. 61%), although the difference is not great. Mothers who knew not much or nothing at all about healthy eating, compared to those who knew a great deal, were far more likely to have children in the poorest diet category (51% vs. 21%), more likely to have children who ate too few vegetables (49% vs. 25%) and more likely to have children who usually snacked on unhealthy foods (77% vs. 54%).

Having used information on healthy eating in general seemed to be statistically significantly associated with a decreased likelihood of having children with sub-optimal eating habits. However, having used such information from health professionals did not seem to be associated with a difference in children's eating habits. Among the other sources of information used on healthy eating, it appeared that having used books and magazines, and the internet for healthy eating information were associated with a much lower likelihood of having children with poor eating habits. For example, among mothers who used the internet for advice, 16% had children in the poorest diet category, compared to 31% among those who had not used this source. Similarly, 22% of mothers who had used books and magazines for advice had children in the poorest diet category compared to 36% who had not used this information source.

The results from the subsequent multivariate logistic regression are presented in Table 28. This shows that the predictive model was better at predicting dietary quality (0.15) than predicting consumption of vegetables (0.06) or unhealthy snacks (0.07). The interaction terms in the model show that maternal cooking knowledge affected their children's diets positively when mothers knew a lot about healthy eating, and it affected children's diets negatively when mothers did not know a lot about healthy eating. Mothers who knew a lot about healthy eating and stated that their cooking knowledge affected what they gave their child to eat were less likely to have children in the poorest diet category (Odds Ratio 0.678) or children consuming few vegetables (OR 0.694) compared to those who know about healthy eating but did not feel their cooking knowledge affected what they give their child to eat. On the other hand, mothers who stated that their cooking knowledge affected their child's diet and that they did not know much about healthy eating were far *more* likely (OR 2.650) to have children eating one or no types of vegetables on a typical day.

Furthermore, maternal knowledge about healthy eating, independently from maternal cooking skills, seemed to be a strong predictor of all three measures of children's dietary outcomes explored in the analysis. The more mothers knew about healthy eating, the less likely they would be to have children with poor nutritional habits. Looking at snacking habits as an example, compared to mothers who knew not very much or nothing at all about healthy eating, those who knew quite a lot had a 40% lower chance (OR 0.620), and those who knew a great deal an approximately 50% lower chance (OR 0.489) of having children who typically snacked on unhealthy foods between meals. These results would justify and support the use of information-based initiatives as a means for helping mothers make healthier food choices. Clearly, mothers who have knowledge about healthy eating seem to be have children with healthier diets, so the importance of educating and informing mothers on issues of healthy eating should not be overlooked, and information-based policies do have a role to play in improving children's diets.

Mothers who reported having used some source of information on healthy eating were less likely to have children in the poorest diet category (OR 0.718), but this variable was not statistically significant for the other two nutrition outcomes. Looking at the specific sources which mothers used for information on healthy eating, Table 28 suggested that having used the internet, and having used books and magazines for advice were the only two sources which predicted statistically significant differences in children's eating habits, controlling for the remaining confounders in the model. The importance of these two variables was evident in the descriptive data in Table 27 discussed above. The regression results suggested that mothers who surfed the internet for information on healthy eating were statistically significantly less likely to have children in the poorest diet category (OR 0.608), or children regularly eating unhealthy snacks between meals (OR 0.700) compared to mothers who had not used the internet for advice. Having used books or magazines for information was only statistically significant in predicting children's vegetable consumption, and mothers who had used this source of advice were less likely (OR 0.897) to have children consuming one or no types of vegetable on a typical day.

In summary, maternal self-reported knowledge about healthy eating, and maternal use of various sources of healthy eating information is correlated with children's eating habits, both in the foods typically consumed during meal times (vegetables) and in the foods children might snack on during potentially less supervised eating opportunities (snacks). Knowledge about healthy eating is usually associated with more quantitative aspects of knowledge about food, related to *how much* or *how little* should be consumed of different foods. But it is worth stressing that maternal confidence in their own cooking skills was also statistically significant in predicting children's eating habits. Thus, policies which inform mothers about *what* foods to eat, should also address *how* these foods can be processed, prepared and presented so that children are more likely to find them appealing.

Table 27 Bivariate analysis: Babies' diets and maternal use of healthy eating advice

All mothers (adjusted %) Baby Cohort SW2	SW2- % Poorest diet category [95 %CI] N:4357		P value	SW2- % eats one or less types of veg./day [95 %CI] N:4362		P value	SW2- % Usually eats unhealthy snacks [95 %CI] N:4368		P value
All mothers	28.2	[26.3-30.2]		30.1	[28.4-31.9]		59.9	[58.2-61.6]	
Cooking knowledge affects what you give child									
A lot/fair amount	24.1	[21.2-27.4]	=0.002	28	[25.3-30.9]	=0.059	57	[53.9-60.0]	=0.023
A little/not at all	29.6	[27.6-31.8]		30.9	[29.0-32.8]		60.9	[59.0-62.8]	
How much parent knows about healthy eating			≤0.001			≤0.001			≤0.001
A great deal	20.7	[18.1-23.5]		24.5	[22.1-27.2]		54	[51.3-56.8]	
Quite a lot	29.1	[27.2-31.1]		30.6	[28.7-32.5]		60.6	[58.7-62.6]	
Not very much/nothing at all	51.3	[45.1-57.5]		49.4	[43.3-55.6]		77.4	[71.8-82.1]	
Used sources of info. on healthy eating	26.2	[24.3-28.2]	≤0.001	29	[27.2-31.0]	≤0.001	59.3	[57.4-61.1]	=0.089
Not used any	39.3	[34.9-43.9]		36.4	[32.4-40.6]		63.3	[59.0-67.5]	
Used healthy eating info. from health professionals	28.5	[26.0-31.3]	=0.699	30.5	[28.3-32.9]	=0.585	60.4	[57.8-62.8]	=0.559
Not used any	28	[25.7-30.3]		29.8	[27.7-32.0]		59.5	[57.5-61.5]	
Used healthy eating info. from family or friends	26.2	[23.6-28.9]	=0.011	29.7	[27.6-32.0]	=0.500	60.1	[57.7-62.4]	=0.832
Not used any	30.5	[28.2-32.9]		30.6	[28.5-32.8]		59.7	[57.3-62.1]	
Used healthy eating info. from other mothers	20.8	[18.4-23.5]	≤0.001	26.7	[24.3-29.1]	≤0.001	56.7	[53.9-59.3]	=0.005
Not used any	31.7	[29.6-33.9]		31.8	[29.7-34.0]		61.4	[59.3-63.4]	
Used healthy eating info. from the internet	16.2	[13.8-18.9]	≤0.001	24.7	[21.9-27.7]	≤0.001	50.5	[47.3-53.7]	≤0.001
Not used any	31.4	[29.3-33.6]		31.6	[29.5-33.7]		62.3	[60.3-64.3]	
Used healthy eating info. from books & magazines	21.9	[20.0-23.9]	≤0.001	25.8	[23.9-27.8]	≤0.001	56.8	[54.7-58.9]	≤0.001
Not used any	35.7	[32.9-38.6]		35.3	[32.9-37.7]		63.5	[61.1-65.9]	
Used healthy eating info. from TV & radio	24.2	[21.2-27.5]	=0.009	26.6	[23.6-29.9]	=0.012	57.6	[53.7-61.4]	=0.165
Not used any	29	[27.0-31.2]		30.9	[29.0-32.8]		60.4	[58.6-62.1]	

1.Data filtered for single-births and cases were mother was biological mother of child**.** Percentages are based on weighted data; N values are based on un-weighted data
2.Significance levels: * p <0.05, ** p <0.01, *** p<0.001

Table 28 Multivariate logit models - Babies' diets and maternal use of healthy eating advice

Variable reference categories in italics Baby Cohort SW2	**MODEL 1 – SW2- Poorest diet category (N:4329)**		**MODEL 2 – SW2- One or less veg./day (N:4334)**		**MODEL 3 – SW2- Usually eats unhealthy snacks (N:4339)**	
	Odds Ratios	**[95% CI]**	**Odds Ratios**	**[95% CI]**	**Odds Ratios**	**[95% CI]**
Cooking knowledge affects what you give child *(A little/not at all)*						
A lot/fair amount		See interaction		See interaction		See interaction
How much parent knows about healthy eating generally						
A great deal	0.383***	[0.262,0.560]	0.348***	[0.244,0.495]	0.489***	[0.337,0.708]
Quite a lot	0.553***	[0.396,0.773]	0.468***	[0.339,0.647]	0.620**	[0.448,0.858]
Not very much/nothing at all						
Used sources of info. on healthy eating *(No)*	0.718**	[0.564,0.913]	0.790	[0.600,1.041]	0.951	[0.748,1.208]
Used healthy eating information from health professionals *(No)*	1.154	[0.967,1.376]	1.077	[0.934,1.242]	1.033	[0.912,1.171]
Used healthy eating information from family or friends *(No)*	1.152	[0.946,1.402]	1.126	[0.980,1.294]	1.171	[0.999,1.371]
Used healthy eating information from other mothers *(No)*	0.857	[0.709,1.035]	1.001	[0.836,1.198]	1.000	[0.850,1.177]
Used healthy eating information from the internet *(No)*	0.608***	[0.492,0.750]	0.897	[0.731,1.100]	0.700***	[0.589,0.832]
Used healthy eating information from books & magazines *(No)*	0.852	[0.718,1.011]	0.834*	[0.709,0.981]	0.988	[0.852,1.146]
Used healthy eating information from TV & radio *(No)*	1.223	[0.979,1.529]	1.037	[0.863,1.246]	1.052	[0.878,1.260]
Sample child's birth order *(Subsequent birth)*						
First birth	0.625***	[0.541,0.722]	0.891	[0.761,1.042]	0.727***	[0.627,0.842]
Gender *(Male)*						
Female	1.158*	[1.000,1.340]	0.994	[0.862,1.146]	0.889	[0.776,1.019]
Mothers Education (SW2) *(Degree or equivalent)*						
Vocational qual/s below degree	1.880***	[1.467,2.410]	1.350**	[1.082,1.685]	1.558***	[1.306,1.859]
Higher grade or equivalent	1.361	[0.968,1.915]	1.481*	[1.060,2.069]	1.584**	[1.169,2.147]
Standard grade or equivalent	2.466***	[1.867,3.259]	1.718***	[1.315,2.244]	1.863***	[1.484,2.338]
No qualifications	4.074***	[2.927,5.671]	2.163***	[1.477,3.167]	2.212***	[1.592,3.073]
Mothers age (in years)	0.975**	[0.959,0.990]	0.990	[0.975,1.006]	0.990	[0.976,1.004]
Mother's ethnic background *(Other)*						
White	0.597*	[0.392,0.909]	0.547*	[0.341,0.879]	0.830	[0.555,1.241]
Family status (SW2) *(Couple household)*						
Single parent household	1.485***	[1.193,1.848]	1.022	[0.825,1.264]	1.035	[0.845,1.267]
Interaction Effects						
Cooking knowledge affects child's diet a lot *AND* Knows great deal about HE *(Ref: Cooking knowledge does not affect child's diet)*	0.678*	[0.487,0.944]	0.694*	[0.519,0.928]	0.799	[0.621,1.026]
Cooking knowledge affects child's diet a lot *AND* Knows quite a lot about HE *(Ref: Cooking knowledge does not affect child's diet)*	0.987	[0.777,1.255]	1.008	[0.825,1.232]	1.088	[0.911,1.299]
Cooking knowledge affects child's diet a lot *AND* Knows not much/nothing about HE *(Ref: Cooking knowledge does not affect child's diet)*	1.682	[0.863,3.277]	2.650**	[1.461,4.809]	0.782	[0.418,1.463]

1.Data filtered for single-births and cases were mother was biological mother of child. N values are based on un-weighted data. Significance levels: * p <0.05, ** p <0.01, *** p<0.001

2.Mod 1: Nag. R2 = 0.15, Goodness of Fit p=0.4852, Standardized Residuals <3, High leverage = 60 obs., Tolerance > 0.200

3.Mod 2: Nag. R2 = 0.06, Goodness of Fit p=0.4670, Standardized Residuals <3, High leverage = 49 obs., Tolerance > 0.200

4.Mod 3: Nag. R2 = 0.07, Goodness of Fit p=0.3462, Standardized Residuals <3, High leverage = 21 obs., Tolerance > 0.200

Discussion

This chapter explored the extent to which maternal knowledge about healthy eating and maternal use of formal and informal sources of advice on aspects of breastfeeding and child nutrition was related to infant nutrition and toddlers' diets controlling for the impact of family and child characteristics known to affect infant and toddlers' diets.

Maternal Knowledge about Healthy Eating and Child Nutrition

Maternal use of information on healthy eating was shown to vary statistically significantly between mothers from different educational backgrounds, and it was hypothesised that mothers' knowledge about healthy eating issues in general would benefit children's diets in infancy and toddlerhood. The results showed that generally, maternal knowledge use of infant and child nutrition was positively linked to infants' and toddlers' nutrition, independently of the effect of maternal and child characteristics on these nutritional outcomes.

Infant Nutrition

The results showed that, controlling for other confounders of infant nutrition, mothers who had at some point attended antenatal classes were far more likely to start breastfeeding, to breastfeed for longer, and to introduce solid foods *after* the child had turned 4 months of age, as recommended in official public health advice. The results also showed that receiving breastfeeding advice from the midwife was associated with mothers being more likely to start breastfeeding, while receiving advice from the health visitor was associated with breastfeeding mothers being more likely to keep breastfeeding for longer. These findings are highly relevant with regard to current public health policy, and confirm that personal face-to-face support is important and welcomed by individuals (Bikker and Thompon, 2006) and that such support offered to families by various health professionals before, during and after child birth is likely to be beneficial for infant nutrition outcomes.

While advice from health professionals was important, the evidence suggested that written sources of advice also have their role to play, as mothers who consulted the *Getting Off to a Good Start* booklet were statistically significantly less likely to introduce solids prematurely. The *Getting Off to a Good Start* booklet focuses primarily on promoting breastfeeding. It does however advise mothers on not introducing solid foods too early in life as this may interfere with the child's demand for breast milk. The booklet does not specify *when* solid foods should or should not be introduced in children's diets. It may be premature to assume that the booklet itself has a 'direct' effect on maternal weaning decisions. It is more likely that mothers who used this booklet were overall more likely to breastfeed and do so for longer, and generally more likely to be aware of the official recommendations regarding the introduction of solids in children's diets. Nevertheless, communicating healthy eating messages through written media is a relatively inexpensive policy tool and appears to be a useful measure in an overall broader range of initiatives aimed at informing mothers on healthy eating and feeding for infants and toddlers.

Given the lack of variables measuring other determinants of infant feeding decisions, the present analysis was unable to compare the use of advice from health professionals to the use of advice from family or friends in relation to infant feeding. Existing evidence in this field has shown that some mothers do not follow official feeding recommendations, either because they favour baby-led feeding, or because they are eager to see their baby grow (Anderson et al., 2001; Bolling et al., 2007). Further research on the ways in which 'formal' and 'informal' advice influence infant feeding practice might yield interesting findings in this respect.

Toddlers' Nutrition

With regard to nutrition in toddlerhood, the results showed that mothers who used the internet and those who used books and magazines for advice on healthy eating were more likely to have children eating healthier diets. As the findings in chapter 6 suggested, it was primarily mothers who were more educated and in more advantaged jobs who used these sources for advice on healthy eating. Thus, children of mothers with more human capital would stand to benefit from cumulative advantages of direct and indirect positive effects that such capital has on maternal knowledge of healthy eating and children's eating habits.

The results showed that mothers who knew a lot about healthy eating were more likely to have children who ate healthier diets. While this is not a particularly surprising association as such, it is interesting to note that maternal healthy eating knowledge was self-reported. It could be deduced that mothers who did *not* know a lot about healthy eating were likely to be aware of this 'lack' of knowledge, and were not oblivious to this fact. This does raise the question as to why these mothers would not actively pursue to 'get informed' on issues of healthy eating, given that they report being aware of not knowing a lot on this matter. It is unlikely that these mothers are simply un-interested in their children's health, and as previous research has suggested, perhaps nutrition-related risks are of secondary importance among mothers who have other more immediate priorities to deal with, like making sure children do not go hungry (Backett-Milburn et al., 2006; Jeffery et al., 2005).

The analysis indicated that some mothers struggle with both a lack of knowledge about healthy eating, and a general lack of skills in food preparation. The results showed that for a sub-section of the population, mothers who do *not* know a lot about healthy eating and who also feel their lack of cooking skills affects their child's diet are far more likely to have children who do not eat enough vegetables on a daily basis. It might be thought that these mothers are also more likely to be eating unhealthier diets themselves, although this is not based on the data as such. These mothers would perhaps benefit from a crash-course on the more common aspects healthy eating education, such as what foods and quantities of food promote health and what foods jeopardise it. More importantly, though, these mothers would stand to benefit from acquiring the basic cooking skills and self-confidence necessary for them to be able to take agency over their own and their child's diet.

Reflections on Social Theory

The results seem to provide some support for the use to information-based initiatives in improving children's nutritional outcomes. It seems that, as Foucault may have argued, mothers who have more knowledge about healthy eating, are empowered and able to achieve healthy eating in practice. So despite the often critiqued argument that personal food choices simply need to be *informed* choices in order to be *healthy* food choices (Carter, 1995; Gillies, 2005; Wall, 2001), there does appear to be a clear link between knowledge about food – and power to act upon this knowledge and put it into practice in the interest of good health (Foucault, 1980).

As was suggested, however, *knowledge* can vary in its provenance, and mothers base their feeding decisions on both formal and informal sources of advice. So while previous evidence had suggested that mothers often feed their infants based on their intuition or advice from family and friends (Anderson et al., 2001; Bolling et al., 2007; Savage et al., 1998), the current evidence points to the positive link between using ‘formal’ advice from health professionals and infant feeding outcomes. Further research could be undertaken to explore the *relative* importance of using formal and informal sources of advice in relation to infant feeding outcomes among mothers in Scotland.

While there was an association between the use of advice on nutrition and children’s nutritional outcomes, knowledge about healthy eating did not seem to account for the broader effect that maternal human capital had on infant and toddler diets. That is to say that children’s diets are heavily influenced by a range of factors associated with the socio-economic and primarily educational characteristics of the mother and family, and using advice on breastfeeding or healthy eating is of secondary importance in relative terms. The results showed that many mothers are well aware that they do not know a lot about healthy eating, despite the heavy emphasis place on healthy child nutrition in public discourse and the media. Ultimately, many mothers have to deal with financial and structural constraints which makes it unfeasible for them to put healthy eating advice into practice. To reflect back upon the discussion of ‘informed choice’ and information-based policy initiatives, a policy strategy which focuses excessively on informing mothers about healthy eating has to acknowledge that some mothers may not have the resources necessary to be able to ‘make’ healthy food choices, despite knowing what these would be in theory (Sen, 1984). Appropriate attention should be given to the financial, material, structural and environmental obstacles which make healthy food choices implausible for mothers in disadvantaged circumstances.

Perhaps this requires a change in rhetoric and a change in thinking about who is held responsible for the poor nutritional habits of children and adults in modern-day Scotland. Currently, a responsibilisation of the individual colours the majority of policy discourse (Garland, 1996; Gillies, 2005; Wall, 2001) where individuals are expected to roam through unfavourable food environments and find their way to health by making the ‘right food choices’. Perhaps shifting at least some of the responsibility to the supply side of food could be a start, achievable through state regulation, subsidy removal and taxation on the consummation or the production of unhealthy foods (Lang et al., 2009). Perhaps this would transform the food environment and eliminate or limit some the ‘wrong food choices’ currently available to individuals and children.

Reflections on Social Policy

The results showed that mothers who use information on breastfeeding and know more about healthy eating also make healthier choices with regard to infant and toddler nutrition. The positive relationship between maternal nutrition knowledge and children’s diets was independent of any effect that maternal educational characteristics had on children’s diets. There appears to be evidence of a positive link between knowledge about healthy nutrition and practice of healthy nutrition. This is encouraging news considering that public health policy has been heavily focused on information-based initiatives which aim to educate mothers on issues of healthy eating to enable them to make healthy food choices. It seems to agree with the assumption that *knowledge* about food and health leads to the *right choices* on food and health.

As was shown in chapter 6, maternal knowledge on healthy eating can be acquired through a variety of formal and informal sources, where advice from health professionals may not always be the most important source of advice for mothers. The analysis of infant feeding practices indicated that mothers who used breastfeeding advice from health professionals had children with positive infant nutrition outcomes, throughout infancy. This applied to health professionals who are involved in supporting mothers, at all stages of the child birth and the early postpartum period. Thus, having attended antenatal classes prior to birth, having received advice from a midwife in the first 10 days postpartum, and having received advice from a health visitor after the first 10 days were all factors which contributed positively to children's infant feeding outcomes, independently of other family or child characteristics known to affect infant nutrition.

These results stress the positive relationship between universal measures to support mothers during childbirth and childrearing with children's health. While breastfeeding rates in Scotland are still low relative to other developed nations, the evidence seems to suggest that resources spent on health professionals such as midwives and health visitors may have a positive effect on breastfeeding and may be well justified. Nevertheless, recent news that health visitor support in Scotland is to be scaled back and become more targeted (Foster, 2008), and news that nursing and midwifery posts will decrease by 2.6% in Scotland (BBC News, 2010/06/03) does not bode well for the future of this form of professional personal support for mothers. Yet, it is difficult to understand how the existing breastfeeding and infant nutrition targets set by the Scottish Government, and endorsed by the WHO are to be met through policy strategies which try to achieve more with less.

While interpersonal forms of support, provided through staff working in the health service are important, there was evidence that using written forms of advice on infant nutrition, such as the *Getting off to a Good Start* booklet, was also associated with healthier infant feeding decisions. This is positive news for health policy as it highlights that relatively inexpensive measures, such as written forms of advice on infant nutrition, can be part of a broader spectrum of policy tools which successfully supports mothers with infant feeding decisions.

Controlling for factors known to influence their diets, using advice on healthy eating from health professionals was not linked to better diets in toddlers. But the findings from chapter 6 indicated that health professionals are more likely to provide more support to families from disadvantaged backgrounds. Thus, a positive association between toddlers' diets and the use of advice from health professionals may be masked by the fact that children who are more likely to benefit from support by health professionals have poorer diets in the first place. The results showed that mothers who used the internet and books and magazines for advice on healthy eating had toddlers with healthier diets. While the data cannot reveal whether online or written resources were based on information grounded in public health recommendations, there seems to be some evidence for the utility of written and virtual forms of communicating advice on healthy eating to mothers. While these forms of support are likely to be cost-effective to adopt, evidence from chapter 6 showed that mothers from more advantaged backgrounds were far more likely to use such resources in the first place, so different formats may be more suitable for families and children more at risk.

While knowing about healthy eating was associated with healthier diets in toddlers, the results also point to the importance of equipping mothers with basic cooking skills. It seems that public discourse and policy on key healthy eating messages focuses extensively on *what* children and adults should eat, and less so on *how* these foods can be eaten. As evidence from across the border had indicated (Department of Health, 2008b) many mothers lack the basic food processing and food preparation skills necessary to be able to make healthy meals from healthy foods. So teaching mothers about, among other things, basic cooking skills, culinary shortcuts, multi-tasking, and batch-cooking could be part of a comprehensive strategy which would aim to enable mothers to make healthy meals out of healthy foods in a way that is compatible with the demands of everyday life.

A range of reflections relevant for public health policy have been outlined. However, these should be understood in relation to the current status quo of infant and toddlers' diets in Scotland. Overall, breastfeeding take-up in Scotland is at 60% which is strikingly lower than in Norway, for example, where 99% of mothers breastfeed at least once. In terms of toddlers' diets, the data showed that 6 in every 10 toddlers snack on nutritionally void refined carbohydrates and sugars on a daily basis before they turn 2 years old. In other words, public health policy striving to provide optimal nutrition for every infant and toddler in Scotland will face a monumental challenge. Strategies which may produce small improvements are welcome, but ultimately, a complete overhaul of the food culture and food supply in Scotland might be necessary in order to achieve substantial change in the diets and health of young children and their families.

Ultimately, the socio-economic and educational background of mothers is, in relative terms, more important in predicting the nutritional habits of infants and toddlers. This background is likely to be instrumental in shaping the food cultures of mothers and children. Given that information-based initiatives are unlikely to offset the broader impact that maternal human capital has on infants' and toddlers' diets, a comprehensive public health policy strategy could also include initiatives which go beyond the 'provision of knowledge' on healthy eating. Further reflections on this issue were discussed in chapters 5 and 6.

Finally, measures which aim to change the behaviours and choices of individuals and families could be supported with measures which aim to modify and improve the obesogenic environments with which mothers and children are faced. Perhaps improving food production and food supply through regulatory and taxation methods applied to both the consumption and the production of food could be a more effective way of dealing with nutrition-related ill health (Caraher and Cowburn, 2005; Leicester and Windmeijer, 2004; McColl, 2009) though such measures might be challenged by corporate interests (Lang et al., 2009). Thus, rather than relying solely on informed individuals making 'correct' food choices in an obesogenic environment, ecological policy strategies could improve the Scottish food landscape and improve the balance in the accessibility and availability of healthy and unhealthy food options.

CHAPTER 8
Nutritional Trajectories and Meal Rituals: Developing eating habits in childhood

Introduction

> *"The shared meal elevates eating from a mechanical process of fueling the body to a ritual of family and community, from the mere animal biology to an act of culture."* (Pollan, 2008:192)

The preceding two chapters address different themes related to children's nutrition. These include an analysis and discussion of the relationship between maternal human capital and children's diets, and an exploration of maternal uses of formal and informal sources of nutrition information, and the relationship between using such information and children's nutritional outcomes.

This chapter addresses two further areas related to children's nutritional habits. First, it aims to understand the extent to which early experiences of nutrition at birth and in infancy predict children's nutritional patterns in toddlerhood. Second, it aims to understand the extent to which eating patterns of the family as a whole explain how children come to develop their nutritional preferences and habits in the context of family life. A full discussion of the relevant empirical research literature, relevant policy developments, and the social theory which informs the analysis and discussion this chapter can be found in chapters 1, 2 and 3 respectively, while a brief overview follows below.

Social Policy

The review of related international policy on child nutrition suggested that the primary focus of most public health initiatives at the WHO and EU levels has been on the one hand to improve the take-up and duration of breastfeeding (European Commission, 2004; WHO, 1990; WHO, 2003b), and on the other hand to improve nutrition among children of school age (WHO, 2004). Thus, international health policy has generally overlooked children's nutrition in the very early years period. This lack of attention to toddlers' and pre-school children's diets is also reflected in public health policy at the Scottish level. Breastfeeding has been on the Scottish public health agenda for some time starting with the Scottish Joint Breastfeeding Initiative in 1990 (Scottish Office, 1993), culminating with the Breastfeeding etc. (Scotland) Act (2005), with ongoing initiatives being carried forward through the Infant Nutrition Strategy (Scottish Government, 2008b). Meanwhile, school children's nutrition has also recently received a lot of policy impetus (e.g. the Final Report of the Expert Panel on School Meals, 2003; Scottish Executive, 2003c), and epitomised by the recent passing of the Schools (Health Promotion and Nutrition) (Scotland) Act 2007.

While the above developments are important in promoting healthy nutrition in children, more attention could be paid to children in their early years. The relatively recent *Nutritional Guidance for Early Years: Food choices for children aged 1-5 years* document announced that the Hungry for Success initiative would be extended to pre-school and childcare centres (Scottish Executive, 2006b) to cover pre-school children. This represented a move in the right direction in terms of addressing this age group, but this initiative caters for young children in a care setting, in pre-schools or nurseries. Policy in Scotland has yet to address adequately children's eating habits as they develop through shared family eating experiences within the privacy of the home. This chapter explores the relationship between family eating habits and toddlers' diets and reflects on how future public health policy can improve toddlers' eating habits as they develop in the context of family life.

Empirical Research Literature

The empirical literature provided evidence of how children's food preferences are affected by their experiences of breastfeeding and weaning in infancy. Previous studies suggested that since breastfed babies are exposed to constantly changing flavours in maternal milk they may be more accustomed to eating a varied and healthier diet as they grow older, compared to those feeding on formula milk (Mennella and Beauchamp, 1991; Mennella et al., 2001; Sullivan and Birch, 1994).

Furthermore, weaning practices may also play an important role in children's development of dietary preferences, and the reviewed research suggested that foods eaten during the weaning period influence children's food preferences in early childhood and later life (Gerrish and Mennella, 2001; Northstone et al., 2001). The analysis for this thesis does not look at the foods used for weaning children from a milk-based diet onto a solid diet, as the GUS survey did not collect this type of information. However, the analysis does focus on the *timing* of weaning and reflects on current Scottish Government advice which recommends that solids are introduced after infants are 4 months old. Evidence from the Glasgow longitudinal infant growth study showed that infants who were weaned sooner were also heavier than average, so premature weaning may be a risk factor for subsequent unhealthy eating, child obesity and poor health (Savage et al., 1998).

Many families will experience parent versus child battles over what foods a child should eat, with vegetables often being the cause of disagreement. Existing studies show that shared family meals promote a higher vegetable consumption in children (Cooke et al., 2003; Gable and Lutz, 2000). Also, meals eaten in front of the television have been associated with a lower consumption of vegetables and fruit (Coon et al., 2001). Ultimately, it is unclear how much 'difficult eaters' are born as such or whether they are socialised into becoming ‘picky’. Nevertheless, joint family meal-times and frequent exposure to ‘problem foods’ are known to increase consumption of such foods in children (Wardle et al., 2003).

But family meal-times can also be distressing, particularly when attempting to feed children undesirable foods, making it at times more practical to just let children choose less healthy, but preferred, options (Brewis and Gartin, 2006; Hoerr et al., 2005). Even though most research portrays children as passive recipients of food, children can actively resist foods they dislike, making it challenging for mothers to control children’s diets (Brewis and Gartin, 2006). The reviewed studies provide interesting insights into young children’s nutrition, but few use longitudinal data, and most are based on qualitative data from non-UK convenience samples. They are therefore unable to explore the development of children’s diets from birth through the early years as they evolve within families living in Scotland. It is these gaps in evidence which the current chapter aims to address.

Social Theory

The previous chapter discussed the emergence of a medicalised approach to child health and nutrition, and a heightened sense of *risk* currently associated with food and feeding. Working from this framework of *risk*, the individual pursuit of health and nutrition is often portrayed as a moral obligation in public discourse (Wall, 2001). This pursuit calls for individuals to invest in their ‘project of the self’ (Giddens, 1991) by ‘regulating’ and ‘civilising’ their bodies (Elias, 1982; Turner, 1987; Turner, 1992), and by adopting health optimising ‘techniques’ for the proper management of the body (Mauss, 1973 [1935]).

Food and eating are not impermeable to these ideas, and our food preferences are socially constructed and culturally contingent (Mead, 1949). Different food rituals and structured eating patterns to which people adhere are a testament to this and in certain respects *how* and *when* we eat overshadows *what* we eat (Douglas, 1972). These theories primarily aim to explain the health and eating habits of adults, and were not designed to specifically explain children’s eating habits. It is proposed that as mothers civilise their own bodies, they will also, whether intentionally or not, attempt to 'civilise' their children's bodies by teaching them to assimilate, among other things, maternal eating habits. As such, a predisposition towards 'healthy eating' can be *cultivated* and *nurtured* in children through their families.

The underlying assumption behind the above discourse is that an 'uncivilised' body is a body which is driven by natural instincts and bodily desires, reflecting a nature vs. nurture dichotomy (Fischler, 1980; Moore, 2003). Undeniably, nature plays a major role in food selection and preferences. However, it is likely that the observed differing nutritional patterns in the population are more a product of a conflict between 'nurture vs. nurture', rather than 'nature vs. nurture'. Thus, both healthy and unhealthy nutritional habits are socially learned and these reflect varying attitudes and beliefs about food and different options available to families living in disparate social and material circumstances.

Research Questions

The two research questions guiding the enquiry for this chapter are outlined below, and each one of these questions is addressed in a separate part of this chapter.

Part 1 ***Q.4 Do children's nutritional trajectories from birth through infancy influence their tastes for food in the early childhood period?***

Part 2 ***Q.5 Do children develop a 'taste' for certain diets through their early childhood experiences of family meal rituals****?*

Part 1 of the chapter addresses the fourth research question originally set out in chapter 3. It is hypothesised that children who have optimal nutritional experiences at birth, are more likely to stay on an optimal nutritional trajectory throughout infancy and into toddlerhood. This would occur primarily as a result of mothers making consistently poor or good choices over time with regard to feeding children. To some extent, however, it is hypothesised that children who start off with optimal nutrition, become accustomed and socialised into liking a more varied diet, which is more likely to include food essential for good health.

Part 2 of the chapter addresses the fifth and final research question. It is hypothesised that family eating patterns which give parents more opportunities to supervise their children's diets, would enable parents to be better able to nurture healthy eating habits in their own children. It is assumed that parents who actively pursue healthy eating for themselves may be more keen to control their children's diets, favouring shared family meals in place of individualised eating habits which can enable parents to monitor children's food consumption.

Analysis and Results: Part 1

Children's Nutritional Trajectories Over Time

The first part of this chapter addressed research question 4:

Q.4 Do children's nutritional trajectories from birth through infancy relate to their tastes for food in the early childhood period?

The operationalisation of this research question involved using two different nutritional outcomes: the introduction of solids, and dietary quality at 22 months. The analysis aimed to establish a) the extent to which having been breastfed predicted when a child was introduced to solids, and b) the extent to which breastfeeding and weaning experiences in infancy predicted dietary quality of toddlers at 22 months of age.

Binary Logistic Regression

Binary logistic regression models were used for the analysis presented in this chapter (An overview of the method and the post-estimation statistics used was outlined in the chapter 4, page 147). Table 7 formulates the combination of variables used to explain whether children were likely to have been introduced to solids before they had turned 4 months of age. The key independent variable of interest is the child's history of breastfeeding, annotated as *BFdur,* which captures whether children had been breastfed at all, and for how long they had been breastfed. The other independent variables controlled for child and family characteristics known to affect children's weaning outcomes.

The variable capturing whether children were weaned prematurely ($InfantNutr_3$) is the dependent variable for the model specified in Equation 12 while it is used as an independent variable for the model specified in Equation 13. Equation 13 formulates the combination of variables used to explain whether toddlers aged 22 months old were in the poorest category on a relative scale of dietary quality, annotated as $DietQual_1$. The key independent variables of interest where children's breastfeeding history (*BFdur*) for both equation 12 and 13 and whether children had been weaned prematurely ($InfantNutr_3$) for equation 13. Interaction effects between $InfantNutr_3$ and *BFdur,* were statistically significant and improved the predictive power of the overall model (based on a Likelihood-Ratio chi-square statistics of $p \leq 0.05$), so they were included in the final model discussed in the analysis. Statistically significant interaction effects between breastfeeding duration and the introduction of solids ($InfantNutr_3 * BFdur$) were expected since the two feeding processes are likely to be closely interlinked and interdependent. Other factors known to influence toddlers' dietary outcomes where also controlled for in the models. The explanation of annotated variables outlines which variables are derived, and points to the page in chapter 4 where variable derivations are explained.

Equation 12 Breastfeeding and subsequent weaning

$$\begin{aligned} Logit(InfantNutr_3) &= a + \beta(BFdur) + \beta(Par) + \beta(Sex) \\ &+ \beta(prem) + \beta(Bweight) + \beta(Edu) + \beta(Age) + \beta(Eth) \\ &+ \beta(FamStat) + \varepsilon \end{aligned} \tag{12}$$

Equation 13 Breastfeeding, weaning and subsequent dietary quality

$$\begin{aligned} Logit(DietQual_1) &= a + \beta(InfantNutr) + \beta(BFdur) + \beta(Par) \\ &+ \beta(Sex) + \beta(prem) + \beta(Bweight) + \beta(Edu) + \beta(Age) \\ &+ \beta(Eth) + \beta(FamStat) + \beta(InfantNutr * BFdur) + \varepsilon \end{aligned} \tag{13}$$

$InfantNutr_3$	- Sweep 1: If child was introduced to solid foods before turning 4 months of age [derived, see page 121]
$DietQual_1$	- Sweep 2: Whether child was in the poorest diet category based on a relative dietary quality scale [derived, see page 122]
BFdur	- Sweep 1: How long child was breastfed for (if breastfed at all) [derived, see page 118]
Par	- Sweep 1: Child's birth order [derived, see page 130]
Sex	- Sweep 1: Child's sex
Prem	- Sweep 1: Whether child was born prematurely [see page 130]
Bweight	- Sweep 1: If children were underweight at birth [see page 130]
Edu	- Sweep 1: Highest maternal educational qualifications achieved
Age	- Sweep 1: Mother's age at the birth of the sample child
Eth	- Sweep 1: Mother's ethnicity
FamStat	- Sweep 1: Family composition, whether a lone-parent family
$InfantNutr_3$*BFdur	-Statistically significant interaction between child's weaning and breastfeeding history
ε	- error term

Both analytical models aim to analyse nutritional trends within individuals over time, albeit using only retrospective data for equation 12, and a mixture of retrospective and prospective data for equation 13. The model outlined in equation 12 uses recall data on breastfeeding duration to predict weaning which was also collected retrospectively. The independent variables include children's birth weight, and information on whether the child was born prematurely. Variables on maternal ethnicity and education reflect characteristics of the mother which precede the birth and pregnancy period. The model specified in equation 13 on the other hand uses the above mentioned retrospectively collected data on breastfeeding and weaning, to predict dietary quality at 22 months of age, which was collected prospectively. However, even dietary quality was in itself based on maternal recall of what children typically ate during the period immediately preceding the second survey sweep. This extensive reliance on recall data comes with considerable risk of bias, which should be considered in the interpretation of results.

Results

Some general univariate statistics are presented in Table 29. These show that overall, 40% of all mothers never breastfed, with a 95% confidence interval of 37.1-42.2%, meaning that 4 in every 10 babies do not receive the mothers' colostrum. Approximately 2 in 10 mothers do breastfeed, but manage to do so for less than 6 weeks, while 2 in 10 mothers breastfeed for more than 6 weeks but less than 6 months. Finally, about 2 in 10 mothers manage complementary breastfeeding for 6 months or longer, although less than 1% of mothers manage *exclusive* breastfeeding for 6 months (Bolling et al., 2007). With regard to the introduction of solids about 16% of mothers in Scotland introduced solids in their infants' diet before they had turned 4 months old, with a 95% confidence interval of 14.8-16.9%. Finally, the variable measuring dietary quality simply aimed to distinguish between those children who were in the lowest 25% of a relative dietary quality scale, and so the univariate statistics simply report that 28% of children were in the poorest diet category[16].

Table 29 Univariate Statistics – Breastfeeding, Weaning and Diet Quality at 22 months

(adjusted %)	**Baby Cohort % [95% CI]**	
Breastfeeding (N:5051)		
Never breastfed	39.6	[37.1-42.2]
Under 6 weeks	17.8	[16.7-19.1]
6 weeks – under 6 months	18.3	[17.1-19.5]
6 months or longer	22.7	[20.9-24.6]
Weaning: introduction of solids (N:4972)		
Weaned at or after 4 months	84.2	[83.1-85.2]
Weaned prior to 4 months	15.8	[14.8-16.9]
Diet Quality at 22 months (N:4357)		
Poorest diet category	28.2	[26.3-30.2]
Not in poorest diet category	71.8	[69.8-73.7]

1.Data filtered for single-births and cases were mother was biological mother of child
2.Percentages are based on weighted data; N values are based on un-weighted data

The results from the bivariate analysis are illustrated in Table 30 and those of the multivariate analysis in Table 31. Table 31 shows that children who were breastfed

[16] The range of the scale used for the classification of children's diets into quartiles was too small to allow for the distribution of scores to be separated into completely equal quartiles. This is why, in total, 28% rather than 25% of the children in the baby cohort were in the poorest dietary quartile.

for longer were statistically significantly more likely to be weaned after 4 months. In total, 23% of mothers who had never breastfed had also introduced their child to solid foods before infants turned 4 months old. The 95% confidence interval suggests that this figure is likely to be between 21.3% and 25.2% for this group in the actual population which the sample has been drawn from. Also, 17% mothers who breastfed for less than 6 weeks, and 12% of those who breastfed between 6 weeks and under 6 months introduced their infant to solids prematurely. Those least likely to introduce solids before the recommended threshold of 4 months were mothers who had breastfed for 6 months or more (c.5%).

Table 30 also shows the relationship between children's breastfeeding and weaning histories with their subsequent dietary quality at 22 months of age. Babies who were never breastfed were most likely (38%) to be in the poorest category on the relative dietary quality scale used for the analysis. Approximately 1 in 4 infants breastfed for under 6 weeks (28%) and 1 in 4 of those who were breastfed for 6 weeks to under 6 months (23%) were subsequently in the poorest diet category at 22 months. Those least likely to be in the poorest diet category were infants who had been breastfed for 6 months or longer (15%). The data also indicate that children who were weaned prematurely were more likely to be in the poorest diet category (40%) than children who were weaned at or after turning 4 months old (26%).

Table 30 Bivariate analysis – Nutritional trajectories over time

All mothers (adjusted %)	**SW1 - % weaned before 4 months (Age: 10m)**		**P value**	**SW2 - % in Poorest diet category (Age: 22m)**		**P value**
Baby Cohort	(N:4972)			(N:4357)		
Weaning: introduction of solids	N/A					≤0.001
Weaned at or after 4 months				25.7	[23.8-27.6]	
Weaned prior to 4 months				40.3	[36.9-43.8]	
Breastfeeding			≤0.001			≤0.001
Never breastfed	23.2	[21.3-25.2]		38.4	[35.6-41.2]	
Under 6 weeks	17.4	[15.3-19.6]		28.1	[24.6-31.8]	
6 weeks – under 6 months	11.8	[9.7-14.2]		23.4	[20.4-26.8]	
6 months or longer	4.7	[3.7-6.0]		14.8	[12.4-17.4]	

1.Data filtered for single-births and cases were mother was biological mother of child
2.Percentages are based on weighted data; N values are based on un-weighted data

The results of the multivariate regression models are shown in Table 31. The first column in the table, Model 1, indicates the results for the analytical model specified in Equation 12, while Model 2 in the second column shows the results of the analytical model specified in Equation 13. Starting with Model 1, the results indicate that, when controlling for family and child characteristics known to affect weaning outcomes, infant breastfeeding histories statistically significantly predicted when babies would be introduced to solid foods. Children who were breastfed for 6 weeks to under 6 months were less likely to be weaned prematurely (Odds Ratio 0.619) than those never breastfed, while those breastfed for 6 months or longer were those least likely to be weaned prematurely (OR 0.278) compared to non-breastfed children. There was no statistically significant difference between infants breastfed for under 6 weeks, and those not breastfed at all in terms of their weaning outcomes.

Model 2 shows the relationship between experiences of breastfeeding and weaning in infancy and subsequent dietary quality at 22 months, controlling for family and child characteristics known to affect dietary quality. The simple association between breastfeeding duration and dietary quality displayed at the top of the table is independent of the *cumulative* relationship observed between weaning and breastfeeding, and children's subsequent dietary quality. The results suggest that the simple association between breastfeeding and diet in toddlerhood is statistically significant, although not very strong. Compared to children who were never breastfed, those breastfed for under 6 weeks, and those breastfed for 6 weeks or more but less than 6 months were less likely to be in the poorest dietary category (OR 0.696 and OR 0.664 respectively). The effect of breastfeeding on subsequent dietary quality is relatively mild, primarily because of the interaction terms that have been included in the model between breastfeeding duration and weaning.

These interaction effects point to some interesting results. Children who were not weaned prematurely *and* who had been breastfed for 6 months or longer were far less likely to be in the poorest diet category at 22 months of age (OR 0.200, after multiplying OR 0.273 and OR 0.731), compared to those who were weaned prematurely but who were also breastfed for 6 months or longer. The data also indicated that children who were not weaned prematurely but were also not breastfed at all were less likely to be in the poorest diet category (OR 0.677), than those who were weaned prematurely and were never breastfed. There were no statistically significant interaction effects between weaning and breastfeeding for infants who were breastfed between 6 weeks and up to 6 months, and infants breastfed for under 6 weeks.

These results suggest that the delayed weaning of infants is statistically significantly positively linked to children's subsequent diets with or without prior breastfeeding. However, this positive effect of delayed weaning is amplified when coupled with a long duration of breastfeeding. On the other hand, the positive relationship between weaning and subsequent diet prevails even among children who were never breastfed, and who could have been assumed to have poorer diets in toddlerhood.

These results reveal that different mothers have different strategies and approaches in feeding their children, but there is an evident display of *consistency* between feeding decisions over time. That is to say that mothers who are more likely to opt for healthier nutritional choices at the child's birth and through infancy, are also more likely to keep opting for healthier nutritional choices as the infant grows to become a toddler. This consistency behind maternal strategies to feeding children partly explains how infants come to embark on, and stay on, different nutritional trajectories from birth through early childhood. The data cannot confirm whether infants have been conditioned to *prefer* or *like* a varied and healthy diet in toddlerhood as a result of having been breastfed in infancy and having been weaned at an optimal time. It can only be assumed that over time the synergy between consistent maternal feeding choices and children's repeated exposure to optimal or sub-optimal nutrition in infancy and toddlerhood contribute to shaping children's nutritional preferences and dietary habits over time.

Table 31 Multivariate logit models - Nutritional trajectories over time

Variable reference categories in italics Baby Cohort	**MODEL 1 – SW1 – Weaned before 4 months (Age: 10m)** (N:4912)		**MODEL 2 – SW2 – Poorest diet category (Age: 22m)** (N:4262)	
	Odds Ratios	**[95% CI]**	**Odds Ratios**	**[95% CI]**
Weaned prematurely *(weaned after 4 months)*	-	-		See interaction
Breastfeeding				
Never breastfed				
Under 6 weeks	0.867	[0.721,1.043]	0.696^{*}	[0.526,0.921]
6 weeks – under 6 months	0.619^{***}	[0.488,0.785]	0.664^{*}	[0.456,0.966]
6 months or longer	0.278^{***}	[0.205,0.378]	0.731	[0.494,1.081]
Sample child's birth order *(Subsequent birth)*				
First birth	0.645^{***}	[0.540,0.770]	0.608^{***}	[0.523,0.708]
Gender *(Male)*				
Female	0.777^{**}	[0.662,0.912]	1.209^{*}	[1.043,1.402]
Born Prematurely *(not born prematurely)*	0.701	[0.486,1.012]	0.766	[0.560,1.048]
Low birth weight *(birth weight not low)*	0.789	[0.513,1.214]	1.147	[0.772,1.704]
Mothers Education (SW1/2)				
Degree or equivalent				
Vocational qual/s below degree	2.294^{***}	[1.790,2.938]	1.721^{***}	[1.358,2.180]
Higher grade or equivalent	1.980^{***}	[1.340,2.926]	1.295	[0.917,1.828]
Standard grade or equivalent	2.243^{***}	[1.641,3.066]	2.397^{***}	[1.825,3.149]
No qualifications	2.284^{***}	[1.561,3.340]	3.841^{***}	[2.848,5.181]
Mothers age (in years)	0.969^{***}	[0.953,0.985]	0.972^{***}	[0.956,0.988]
Mother's ethnic background *(Other)*				
White	1.630	[0.926,2.869]	0.506^{**}	[0.313,0.818]
Family status (SW1/2) *(Couple household)*				
Single parent household	1.608^{***}	[1.312,1.971]	1.493^{***}	[1.188,1.877]
Interaction *(Ref: weaned prematurely)*				
Did not wean prematurely AND *Never breastfed*	-	-	0.677^{**}	[0.531,0.863]
Did not wean prematurely AND Breastfed under 6 weeks	-	-	1.335	[0.852,2.091]
Did not wean prematurely AND B.fed 6 weeks under 6 months	-	-	0.935	[0.510,1.712]
Did not wean prematurely AND Breastfed 6 months or longer	-	-	0.273^{***}	[0.138,0.541]

1.Data filtered for single-births and cases were mother was biological mother of child**.** N values are based on un weighted data.
2.Significance levels: * p <0.05, ** p <0.01, *** p<0.001
3.Mod 1: Nag. R2 = 0.13, Goodness of Fit p=0.0210, Standardized Residuals <3, High leverage = 67 obs., Tolerance > 0.200
4.Mod 2: Nag. R2 = 0.15, Goodness of Fit p=0.5144, Standardized Residuals <3, High leverage = 33 obs., Tolerance > 0.200

Analysis and Results – Part 2

The Link Between Family Eating Habits on Children's Diet

The second part of this chapter addresses the fifth research question outlined below:

Q.5 Do children develop a 'taste' for certain diets through their early childhood experiences of family meal rituals*?*

This question was operationalised by looking at the extent to which the diets of children aged just under five could be explained by variables which captured the eating habits and meal patterns of the family as whole, such as: children eating together with parents; eating the same food as parents; eating in a room designated for food consumption. The toddler cohort from the GUS survey was used for this part of the analysis, for reasons outlined below, which is why this part of the analysis looks at the nutritional habits of children aged just under five years of age.

Binary Logistic Regression

In order to answer this question with the data available in the GUS survey, binary logistic regression models were specified and run [an overview of the method and the post-estimation statistics used was outlined in chapter 4, page 147]. A step by step description of the analytical strategy adopted for the specification and testing of binary logistic regression models has also been outlined on page 261 in this chapter. Table 12 on page 141 in chapter 4 specifies the combination of indicators of family meal rituals used to predict children's diets when they were just under 5 years of age (58 months old). This model is based on the toddler cohort data from the GUS survey, rather than the baby cohort data used for Part 1 in this chapter, and for the majority of the analysis in this thesis. The fifth research question outlined above could only be addressed with data collected for the toddler cohort, where variables on nutrition and meal habits were collected in the sequential order necessary to allow for the above specified model to be applied. A resulting limitation, however, is that data on breastfeeding duration and weaning was not collected for the toddler cohort, and these variables could therefore not be included as control variables in the analysis. The explanation of annotated variables outlines which variables are derived, and points to the page in chapter 4 where variable derivations are explained.

Equation 14 Family meal habits and children's diets

$$\begin{aligned} Logit(Diet_{1,2,3,4}) &= a + \beta(Together1) + \beta(Together3) + \beta(Time) \\ &+ \beta(Same) + \beta(Room) + \beta(Takeaway) + \beta(Fresh) \\ &+ \beta(Mrush) + \beta(Mtalk) + \beta(Menjoy) + [\beta(Easy)] \\ &+ \beta(Par) + \beta(Sex) + \beta(Edu3) + \beta(Age) + \beta(Eth) \\ &+ \beta(FamStat3) + \varepsilon \end{aligned} \tag{14}$$

$Diet_1$	- Sweep 3: If child is in poorest category of a relative scale on dietary quality [derived, see page 122]
$Diet_2$	- Sweep 3: If child eats one or less than one type of vegetable per day [derived, see page 125]
$Diet_3$	- Sweep 3: If child usually snacks between meals on one or more of the following: crisps, cakes or biscuits, sweets or chocolate [derived, see page 125]
$Diet_4$	- Sweep 3: If child is a fussy eater, as opposed to child eating most food or eating a reasonable variety of foods [derived, see page 126]
Together1	- Sweep 1: How often child ate with parent and other family members at SW1 (aged 34 months)
Together3	- Sweep 3: How often child eat with parent and other family members at SW3 (aged 58 months)
Time	- Sweep 3: How often child has meals at regular times [derived, see page 139]
Same	- Sweep 3: How often child eat the same food as mothers for the main meal [derived, see page 139]
Room	- Sweep 3: Where in the house the child usually eats his/her mail meal [derived, see page 139]
Takeaway	- Sweep 3: How many days in last week child had eaten a main meal from a take-away (e.g. fish and chips) [derived, see page 139]
Fresh	- Sweep 3: How many days in last week child had eaten a main meal made with fresh ingredients [derived, see page 139]

Mrush	- Sweep 3: If parent feels that "meal-times are a rush"
Mtalk	- Sweep 3: If parent feels that "meal-times give us time to talk to each other"
Menjoy	- Sweep 3: If parent feels that "meal-times are enjoyable for everyone"
Easy	- Sweep 3: If parent feels child is easy or difficult to feed (Not included for the analysis of whether a child is a fussy eater) [derived, see page 139]
Par	- Sweep 1: Child's birth order
Sex	- Sweep 1: Child's sex
Edu3	- Sweep 3: Highest maternal educational qualifications achieved at sweep 3
Age	- Sweep 1: Mother's age at the birth of the sample child
Eth	- Sweep 1: Mother's ethnicity
FamStat3	- Sweep 3: Family composition, whether a lone-parent family at sweep 3
ε	- error term

In Equation 14 the dependent variable *Diet* is an overarching term for 4 different nutritional outcomes explored in the analysis. The first three outcomes, children's relative dietary quality, their vegetable consumption and their snacking habits, have been explored before in chapter 6. The fourth nutritional outcome aims to capture the extent to which the child has a varied diet. This measure, much like the first three, is based on the mother's perception and evaluation of the variety of foods a child typically eats. As such, there is considerable room for reporting bias, and this should be taken into consideration in the interpretation of results. Also, for the analysis of this fourth particular nutritional outcome, the independent variable annotated as *Easy* was intentionally left out from the analytical model, because it was highly predictive of whether children were fussy eaters or not. This is unsurprising considering that these two variables are essentially capturing the same phenomenon, that is, maternal evaluations of whether their child is a 'picky' eater.

Finally, the analytical model aims to explore whether shared family eating opportunities help mothers teach their children to adopt healthier eating habits. The specification of the analytical model draws on the reviewed theoretical and empirical work which suggests that the process of eating can influence the food eaten, and that meal habits which bring the family together favour healthier eating habits in children. This is why indicators which suggested that families share meals together in a pleasant, rather than stressful, atmosphere were considered to be useful indicators of how the nature and social quality of meal times related to food eaten by children. A different analytical approach could have focused on the extent to which the food children eat or refuse to eat affects the meal habits and social quality of mealtimes in families, thus exploring the reverse relationship. In essence, how families eat and what they eat are likely to involve paths of cyclical causality. Since information on meal habits and dietary quality were drawn from the same sweep, the cross-sectional design of this part of the analysis cannot help to reveal the temporal nature of the causal links between meal habits and dietary quality, although this task may prove difficult even when using longitudinal data.

GUS data do not provide dietary information for mothers. Thus, it is not possible to distinguish between mothers who actually pass on their own *unhealthy* habits to their children through shared family eating opportunities. Clearly, in a social setting such as Scotland, where a large proportion of the adult population has suboptimal nutritional habits (Wrieden et al., 2006), the results of the outlined analytical plan may be obscured. Nevertheless, an assumption has been made, drawing on reviewed empirical literature and social theory, that mothers who are more ‘hands on’, physically present and involved in children’s food consumption are more likely to be from more advantaged backgrounds, and more likely to therefore be eating healthier diets themselves. Ideally, the analysis would control for maternal dietary habits, and while this is not currently possible with existing GUS data, it could be captured in future data collection sweeps. Other variables were explored in the initial stages of analysis but these were not found to be statistically significant and were not included in the analysis[17].

[17] These variables included: whether the child eats the main meal at home, how often the child eats the same time as other people in the household, whether the child eats the main meal of the day with the father or mother, whether children ate fast-food meals, frozen ready meals, or meals in sit-down restaurants.

Results

Some general univariate statistics on the meal habits of toddlers and their families are presented in Table 32. They indicate that almost all children ate a main meal with their mothers every day or on most days, both at the 34 months of age (96%) and at 58 months of age (95%). About 3 in 4 children had meals at regular times, and a similar proportion (70%) ate the same food as parents always or almost always. It was interesting to note that 7% of children never or almost never ate the same food as their parents for their main meal. A third of children ate their main meal in a room not traditionally associated with food consumption, such as the bedroom. A small minority (3%) appeared to have a take-way as a main meal twice or more in a week while 3 in 4 children ate a main meal prepared with fresh ingredients at least 5 times per week. In terms of the social quality of meal-times, 15% of mothers felt that meal-times were a rush most of the time, and 20% felt that meal-times never or only occasionally gave the family a chance to talk. Unfortunately, 1 in 4 mothers felt that meal-times were never or only occasionally enjoyable for everyone, confirming that meal-times are often a difficult time in the day for many mothers. In light of the above, it was not surprising that 1 in 5 mothers felt that their child was fairly or very difficult to feed.

Table 32 Univariate Statistics - Family meal habits

All mothers (adjusted %) Toddler Cohort at 58 months (SW3)	**SW3 – Toddler Cohort % [95% CI]**	
How often child eats with parent & family (SW1-34months) [N:2748]		
Every day/ most days	96.1	[95.2-96.7]
Twice a week/less often/never	3.9	[3.3-4.8]
How often child eats with parent & family (SW3-58months) [N:2245]		
Every day/ most days	94.6	[93.3-95.6]
Twice a week/less often/never	5.4	[4.4-6.7]
How often child has meals at regular times [N:2245]		
Always	74	[71.9-76.0]
Usually/sometimes/never	26	[24.0-28.1]
How often child eats same food as parent for main meal [N:2206]		
Always/almost always	70.3	[68.0-72.4]
Sometimes	22.4	[20.4-24.5]
Never, almost never	7.3	[6.1-8.7]
Where child usually eats main meal [N:2187]		
Kitchen, dining room, living room-dining room	66.8	[63.6-69.8]
Other room	33.2	[30.2-36.4]
Days last week that child ate take-away meal (e.g. fish & chips) [N:2245]		
Once or less	97.1	[96.1-97.9]
Twice or more	2.9	[2.1-3.9]

Days last week child ate main meal made with fresh ingredients [N:2244]		
4 times or less	24.8	[22.4-27.4]
5-7 times	75.2	[72.6-77.6]
"Meal-times are a rush" [N:2246]		
Quite often/mostly	14.8	[13.4-16.3]
Never/Occasionally	85.2	[83.7-86.6]
"Meal-times give us time to talk to each other" [N:2245]		
Quite often/mostly	80.2	[77.9-82.3]
Never/Occasionally	19.8	[17.7-22.1]
"Meal-times gives are enjoyable for everyone" [N:2246]		
Quite often/mostly	74.8	[72.9-76.6]
Never/Occasionally	25.2	[23.4-27.1]
How easy or difficult is child to feed? [N:2245]		
Very/fairly easy	69.1	[66.9-71.2]
Neither easy nor difficult	12.5	[11.1-14.1]
Fairly/very difficult	18.4	[16.8-20.1]

1.Data filtered for single-births and cases were mother was biological mother of child**.** N values are based on un weighted data.
2.Significance levels: * p <0.05, ** p <0.01, *** p<0.001

A correlation matrix exploring the interrelationship between indicators of meal habits indicated that, as expected, several meal habits were correlated. The strongest correlations were noted for whether children ate the same food as parents for their main meal and whether mothers felt their children were easy to feed (0.3958), and between whether parent felt meal-times gave the family time to talk and if meal-times were enjoyable for everyone (0.3716). Also, mothers who felt their child was easy to feed were more likely to consider meal-times enjoyable (0.3253). Finally, it appeared that children who ate the same food as mothers were also more likely to be eating a meal made with fresh ingredients (0.2069).

The results of the bivariate descriptive analysis have already been outlined in Table 13 (chapter 5, page 163). Looking at the nutritional patterns of all children collectively, 41% of children ate one or fewer types of vegetables per day, 69% usually ate some sort of unhealthy snack between meals, and 25% are described by their mothers as being fussy eaters, and therefore reluctant to eat a variety of foods.

Some interesting results emerged when looking at the relationships between eating meals with mothers and children's dietary outcomes. Children who mostly ate together with their mothers when they were 34 months old were less likely to be described as fussy eaters (24%) two years later at the age of 58 months compared to those who ate with their mothers less often (37%). Surprisingly, children who mostly ate together with their mothers at the age of 58 months, did not differ statistically significantly ($p=0.422$) in terms of being described as fussy eaters at the age of 58 months from those who ate with their mothers less often.

There was a marginally statistically non-significant ($p=0.096$) relationship between eating meals together with mothers at 58 months and dietary quality at 58 months, but this variable *was* statistically significant in the multivariate regression model (Table 34). The results suggest that children who only ate main meals with mothers twice per week or less were less likely to be in the poorest diet category (23%) compared to children who ate with their mothers on most or every day (30%). Among the toddler cohort only 120 of 2245 children ate together with parents twice per week or less often, and within this group there appears to be a lot of variation in children's dietary quality. This can be seen by the wide 95% confidence interval of 16.7% to 31.5% for this category. Possible explanations for this result are discussed following the reporting of the multivariate logistic regression results for this variable (page 278).

Maintaining a regular meal schedule seemed to be related to positive nutritional outcomes for children. Compared to children who always had meals at regular times, children on less regular meal schedules were more likely to be in the poorest diet category (37% vs. 28%), more likely to be eating too few vegetables (49% vs. 38%), more likely to be typically snacking on unhealthy foods between meal-times (73% vs. 68%), and more likely to be defined as fussy eaters (31% vs. 23%).

Whether children would eat the same food as their mothers for their main meal was a highly statistically significant predictor ($p\leq0.001$) for all four nutritional outcomes explored in the analysis. Compared to those who never or almost never ate the same food as mothers, children who always or almost always ate the same food as mothers were far less likely to be in the poorest diet category (26% vs. 45%) and less likely to be snacking on unhealthy foods between meals (67% vs. 76%). More interestingly, 75% of children who never or almost never ate the same foods as parents were eating too few vegetables per day compared to 32% of those who usually ate the same food as parents. Furthermore, children were far more likely to be described as fussy eaters if they did not eat the same food as parents (83%) compared to those usually eating the same foods as parents (13%). This latter result means that children who ate the same food as parents were therefore more likely to be eating a varied diet.

Children who ate in a room traditionally designated for eating food, such as the kitchen or the dining room, had statistically significantly better diets than those who ate in a room not typically designated for eating meals. Compared to children who ate in 'other' rooms, those eating meals in the kitchen or in a dining area where less likely to be in the poorest diet category (25% vs. 40%), less likely to be consuming too few vegetables per day (38% vs. 44%), less likely to be snacking on unhealthy snacks (66% vs. 75%), and less likely to be described as fussy eaters (20% vs. 30%).

Frequently eating take-away meals was associated with poorer nutritional habits for children. For example, 29% of children who ate take-away meals once per week were in the poorest diet category, compared to 58% of children who ate take-away meals two or more times per week. On the other hand, children who usually ate a main meal made with fresh ingredients had better diets than those who had such meals less often. This applied to all four nutritional outcomes, but was particularly important for vegetable consumption, where 26% of children who ate meals prepared with fresh ingredients 5-7 times per week ate too few vegetables, compared to 54% of children who ate such meals 4 times or less per week.

Maternal evaluations of the social aspect of meal-times statistically significantly predicted children's nutritional outcomes. To illustrate with some of the more striking selected examples, mothers who described meal-times as 'a rush' were more likely to have children who ate too few vegetables on a typical day (53%) compared to mothers who did not describe meal-times that way (39%). Also, mothers who described meal-times as a time for family members to 'talk to each other' were less likely to have children in the poorest diet category (27%) compared to mothers who did not describe meal-times that way (44%). Finally, mothers who felt that meal-times were usually 'enjoyable for everyone' were also less likely to describe their child as a fussy eater (19%) compared to mothers who did not consider meal-times to be enjoyable (42%).

Maternal assessments of whether their child was difficult or easy to feed statistically significantly predicted all four nutritional outcomes explored in the analysis. For example, 68% of children described as ‘difficult to feed’ ate one or no vegetables on a typical day, while 32% of children described as easy to feed ate as many vegetables. This variable was a particularly strong predictor of the fourth nutritional outcome which explores whether mothers felt the child was a fussy eater (as opposed to eating a varied diet). In fact, 83% of children described as difficult to feed were also described as fussy eaters, and only 6% of those described as easy to feed were also described as fussy eaters. The strength of the correlation between this independent and dependent variable is not surprising as the two measures are essentially capturing the same underlying maternal perception. In fact, the overlap between these two indicators was large enough to warrant the exclusion of this independent variable (annotated as *Easy*) from the multivariate logistic regression model for the analysis of the fourth nutritional outcome: i.e. whether children were considered fussy eaters or not.

Table 33 Bivariate analysis – Family meal habits and children's diets

All mothers (adjusted %) Toddler Cohort at 58 months (SW3)	SW3 % Poorest diet category [95 %CI] N:2243		P value	SW3 % eats one or less types of veg./day [95 %CI] N:2245		P value	SW3 % Usually eats unhealthy snacks [95 %CI] N:2246		P value	SW3 % Child is fussy eater [95 %CI] N:2245		P value
All mothers	30.1	[27.7-32.5]		40.7	[38.3-43.1]		68.9	[66.4-71.2]		24.9	[23.1-26.7]	
How often child eats with parent & family (SW1-34months)			=0.466			=0.410			=0.392			=0.010
Every day/ most days	30.2	[27.9-32.7]		40.5	[38.2-43.0]		68.7	[66.3-71.1]		24.4	[22.6-26.3]	
Twice a week/less often/never	26.5	[18.0-37.3]		45.4	[34.0-57.3]		73.9	[61.3-83.5]		36.9	[27.3-47.7]	
How often child eats with parent & family (SW3-58months)			=0.096			=0.356			=0.933			=0.422
Every day/ most days	30.4	[28.0-33.0]		40.5	[38.0-43.0]		68.9	[66.3-71.4]		24.7	[22.9-26.5]	
Twice a week/less often/never	23.3	[16.7-31.5]		44.8	[35.9-54.1]		68.5	[58.3-77.2]		28.2	[20.1-38.0]	
How often child has meals at regular times			≤0.001			≤0.001			=0.034			≤0.001
Always	27.8	[25.3-30.4]		37.9	[35.2-40.7]		67.5	[64.6-70.3]		22.8	[20.8-24.9]	
Usually/sometimes/never	36.5	[32.4-40.8]		48.6	[44.7-52.4]		72.8	[68.7-76.5]		30.8	[27.3-34.5]	
How often child eats same food as parent for main meal			≤0.001			≤0.001			≤0.001			≤0.001
Always/almost always	25.6	[23.1-28.3]		31.8	[29.2-34.4]		66.5	[63.7-69.3]		13	[11.3-14.8]	
Sometimes	37.7	[33.6-42.0]		54	[48.9-58.9]		74.2	[70.3-77.7]		38.4	[33.1-43.9]	
Never, almost never	45.3	[37.6-53.2]		75.3	[67.8-81.5]		76.2	[68.3-82.6]		82.6	[75.7-87.8]	
Where child usually eats main meal			≤0.001			=0.009			≤0.001			≤0.001
Kitchen, dining room, living room-dining room	24.9	[22.5-27.3]		37.6	[34.9-40.4]		66.2	[63.4-69.0]		20.4	[18.2-22.8]	
Other room	39.6	[35.5-43.9]		44.3	[40.2-48.6]		74.7	[70.5-78.5]		30.1	[26.4-34.0]	
Days last week that child ate take-away meal (e.g. fish & chips)			=0.011			=0.047			=0.033			=0.227
Once or less	29.2	[26.8-31.7]		40.3	[37.9-42.8]		68.5	[66.0-70.9]		24.7	[22.9-26.6]	
Twice or more	58.2	[43.9-71.3]		52.8	[40.5-64.7]		81.3	[70.1-89.0]		31.5	[21.1-44.2]	

[Table 33 continued]

Days last week child ate main meal made with fresh ingredients			≤0.001			≤0.001			≤0.001			≤0.001
4 times or less	42.6	[38.0-47.3]		53.7	[49.5-57.9]		75.1	[71.3-78.5]		34.4	[30.6-38.4]	
5-7 times	25.9	[23.6-28.3]		36.4	[34.0-38.8]		66.9	[63.9-69.7]		21.7	[19.8-23.8]	
"Meal-times are a rush"			=0.121			≤0.001			=0.133			≤0.001
Quite often/mostly	33.8	[28.4-39.6]		52.8	[46.6-58.9]		72.8	[66.9-78.0]		38	[32.8-43.5]	
Never/Occasionally	29.4	[27.0-31.9]		38.6	[36.3-41.0]		68.2	[65.6-70.6]		22.6	[20.8-24.5]	
"Meal-times give us time to talk to each other"			≤0.001			≤0.001			≤0.001			≤0.001
Quite often/mostly	26.5	[24.2-28.8]		37.3	[34.8-39.9]		66.8	[64.2-69.3]		21.7	[19.8-23.8]	
Never/Occasionally	44.4	[39.1-49.9]		54.3	[49.3-59.2]		77.1	[72.2-81.3]		37.3	[33.0-41.9]	
"Meal-times gives are enjoyable for everyone"			≤0.001			≤0.001			=0.021			≤0.001
Quite often/mostly	27	[24.5-29.6]		36.2	[33.8-38.6]		67.4	[64.9-69.9]		19.2	[17.4-21.1]	
Never/Occasionally	39.2	[34.7-43.9]		54.2	[49.4-58.9]		73.1	[68.4-77.3]		41.8	[37.2-46.5]	
How easy or difficult is child to feed?			≤0.001			≤0.001			=0.019			≤0.001
Very/fairly easy	27	[24.7-29.4]		31.8	[29.3-34.3]		67.4	[64.7-70.0]		6.4	[5.2-7.9]	
Neither easy nor difficult	34.6	[29.3-40.4]		49.9	[43.7-56.1]		75	[69.8-79.6]		41.4	[36.4-46.5]	
Fairly/very difficult	38.4	[32.9-44.3]		68.1	[63.0-72.7]		70.3	[65.6-74.5]		83	[78.8-86.5]	

1.Data filtered for single-births and cases were mother was biological mother of child. Percentages are based on weighted data; N values are based on un-weighted data

2.Significance levels: * p <0.05, ** p <0.01, *** p<0.001

The results from the multivariate logistic regression analysis are presented in Table 34, which shows that the model was best at predicting if children were fussy eaters (R^2 0.30), and weakest in predicting children's consumption of unhealthy snacks (R^2 0.05).

Meal Company

Table 34 shows that whether or not children ate with their parents at 34 months of age did not statistically significantly predict any differences in children's nutritional outcomes, controlling for the remaining variables in the model. On the other hand, eating together with parents and family at the age of 58 months predicted children's dietary quality overall, and whether children were perceived as fussy eaters or ate a varied diet, confirming the results emerging from the initial descriptive statistics. Table 34 shows that children who ate with their parents *less often* at 58 months of age were less likely to be in the poorest diet category (Odds Ratio 0.498) compared to those who ate meals with their parents every day or on most days. Similarly, children who ate with their parents and family less often were less likely to be described as children who are fussy and do not eat a varied diet (OR 0.547).

Concluding from the above evidence that children who eat with their parents have poorer diets might perhaps be premature. Data on children's diets are based exclusively on maternal awareness of what the child eats, so it is difficult to evaluate how accurate the dietary information is for children who did not often eat with their family. A speculative interpretation could be that mothers who did not often eat with their children were over-reporting or over-estimating the healthy foods and under-estimating the unhealthy foods which these children ate.

Meal Timing

Looking at meal timing, the results suggest that children who did not always eat meals at regular times were more likely to be in the poorest diet category (OR 1.294). Meal timing did not predict statistically significant differences in the other three nutritional outcomes explored for the analysis. With regard to what room meals were eaten in, it seems that children who did not eat in a designated eating area such as the kitchen or dining area, were more likely to snack on unhealthy foods between meals (OR 1.379). The relationships between this variable and children's dietary quality was marginally statistically non-significant (p=0.067).

Adult Food

While eating *with* parents did not seem to make a dramatic difference on children's eating habits, and provided controversial results, it seems that eating the *same food* as parents was positively linked to children's dietary habits. In fact, the likelihood of children having healthy dietary habits increased together with an increase in the frequency of eating the same food as mothers. Compared to children who always or almost always ate the same food as parents for their main meal, those who sometimes ate the same food were more likely (OR 1.541), and those who never or almost never ate the same food were even more likely (OR 1.806) to be in the poorest diet category. The results were even more pronounced for vegetable consumption. Compared to children who always ate the same food as parents, those who sometimes ate the same food had twice the chance (OR 1.998) of eating too few vegetables, while those who never ate the same food as parents had more than three times the chance (OR 3.291) of eating too few vegetables on a typical day. It seems that children who only ate the same food as parents 'sometimes' were more likely to snack on unhealthy foods, compared to those always eating the same food as parents during meal-times (OR 1.272).

There are some intriguing results regarding the relationships between eating the same food as parents and the chance of children being described as fussy eaters. The data suggest that children who never ate the same food as parents had an almost 30-fold chance (OR 27.93) of being considered fussy eaters. Clearly, there is an issue of collinearity between the dependent and independent variables in question here, as indicated by the unusual magnitude of the odds ratio. There is also a potential problem with reciprocal causality, whereby children who are fussy eaters are less likely to be offered the food that mothers eat, leaving children's 'fussiness' unchallenged, and resulting thus in a cycle of negative reinforcement.

Overall, the results suggest that children are nutritionally better-off by eating the same food as parents, and this holds independently of whether children eat meals *together with* parents or not. Thus, despite the fact that in general terms Scottish dietary habits among adults are not very healthy (Wrieden et al., 2006), it seems that children are still better-off eating the same foods as adults than they are following a tailored ‘children’s menu’. In a context of increasingly individualised eating habits, and a rise in ‘child-menus’ and ‘children’s food’, it is important to stress that children appear to be better-off, from a nutritional point of view, by being encouraged to eat the same foods as their parents.

Home-made Meals

Looking at the data on meal composition, Table 34 indicates that children who ate take-away meals for two or more main meals per week were far more likely to be in the poorest diet category (OR 2.238) compared to those who ate take-away once per week or less often. Eating take-away meals did not statistically significantly predict any of the other three dietary outcomes explored. On the other hand, frequently eating meals prepared with fresh ingredients meant children had healthier dietary habits. Compared to those who ate a main meal with fresh ingredients 5-7 times per week, those who ate such meals 4 times or less per week were more likely to have overall poorer dietary habits (OR 1.492), more likely to consume fewer vegetables (OR 1.562) and more likely to eat unhealthy snacks between meals (OR 1.323).

Meal Enjoyment

It was hypothesised that maternal perceptions of the social quality and enjoyment of shared meal-times would be a good indicator of children’s dietary habits. The results suggested that mothers who mostly or often felt that meal-times were ‘a rush’ were more likely to describe their children as fussy eaters (OR 1.506), compare to those who felt they were never or only occasionally a rush. Mothers who felt that meal-times mostly gave the family time to talk were less likely to have children in the poorest diet category (OR 0.638), less likely to have children consuming too few vegetables (OR 0.719) and less likely to have children snacking on unhealthy foods (OR 0.720). Finally, mothers who felt that meal-times were mostly enjoyable for everyone were less likely to describe their children as fussy eaters (OR 0.532) compared to those who felt meal-times were only occasionally or never enjoyable. It is fairly simple to imagine why mothers who have children they consider to be fussy eaters are unlikely to enjoy eating meals with them. The evidence seems to point to the importance of ritual aspects of eating and meal habits in the overall nutrition of children, suggesting that *how* we eat is related to *what* we eat. However, as was suggested previously, there is potential for reverse causality in the above results. It could be that children who are not fussy eaters in the first place and eat a healthier diet do not give parents any reason to initiate arguments, and mealtimes become enjoyable as a result. The data are unable to reveal the causal direction of this relationship.

Feeding Challenges

Finally, the variable indicating whether children were difficult or easy to feed, based on maternal evaluations of their children, was statistically significant in predicting children's vegetable consumption, but not statistically significant in predicting dietary quality overall or children's snacking habits. This variable was not included as an independent variable in the model exploring whether children were considered fussy eaters as the predictor and the outcome seemed to, in this case, be measuring the same underlying concept. The results suggest that, compared to children who were easy to feed, those who were neither easy nor difficult to feed were more likely (OR 1.746) and those who were difficult to feed were far more likely (OR 2.900) to be eating one or fewer types of vegetables per day. Again, there is an issue of overlap with the indicators used for the analysis, as mothers who report that their children do not eat many vegetables, are likely to consider their children difficult to feed. Also, given the potential for reverse causality between this variable and the outcome variable, this result could simply be highlighting that children who eat a healthy diet are considered easy to feed. This variable was intended to capture the occurrence of conflict between mother and child on issues of food, and thus indicate whether feeding a child was a positive or negative experience for the mother. However, given the substantive overlap between this variable and the outcome variables, there could be scope to exclude it from explanatory models in future analyses.

Siblings

As far as the family-level and child-level control variables are concerned, some interesting results emerged with regard to children's birth order. First born children were generally more likely to have healthier diets than children with siblings. For example, firstborns were less likely to be in the poorest diet category (OR 0.591) and less likely to be considered fussy eaters (OR 0.722). There are a number of reasons why this may be the case. One explanation could be that subsequent-born children are being influenced by potentially 'rebellious' attitudes of older siblings with regard to food, and are thus refusing to eat foods which an older and possibly more vociferous brother or sister is refusing to eat.

A second scenario could be that mothers of first born children have, as a result of being new to parenting, more idealised attitudes to child nutrition coupled with more energy and patience to invest in convincing the child to eat healthier foods. Finally, it could be that mothers who are already taking care of an older child, do simply not have the time and physical capability to supervise and monitor the diet of a subsequent child as effectively as those who only have one child to care for. The truth is likely to involve a combination of these three explanations.

Table 34 Multivariate logit models - Family meal habits and children's diets

Variable reference categories in italics Toddler Cohort at 58 months (SW3)	**MODEL 1 – SW3 Poorest diet category (N:2175)**		**MODEL 2 – SW3 One or less veg./day (N:2177)**		**MODEL 3 – SW3 Usually eats unhealthy snacks (N:2177)**		**MODEL 4 – SW3 Child is a fussy eater (N:2177)**	
	Odds Ratios	**[95% CI]**	**Odds Ratios**	**[95% CI]**	**Odds Ratios**	**[95% CI]**	**Odds Ratios**	**[95% CI]**
How often child eats with parent & family (SW1-34 months) *(Every day/most days)*								
Twice a week/less often/never	0.730	[0.415,1.287]	0.704	[0.375,1.323]	1.151	[0.611,2.169]	0.986	[0.594,1.636]
How often child eats with parent & family (SW3-58 months) *(Every day/most days)*								
Twice a week/less often/never	0.498*	[0.286,0.868]	0.820	[0.512,1.313]	0.825	[0.483,1.410]	0.547*	[0.302,0.991]
How often child has meals at regular times *(Always)*								
Usually/sometimes/never	1.294*	[1.030,1.626]	1.214	[0.974,1.512]	1.170	[0.914,1.498]	1.112	[0.826,1.497]
How often child eats same food as parent for main meal *(Always/almost always)*								
Sometimes	1.541***	[1.210,1.962]	1.998***	[1.517,2.633]	1.272*	[1.015,1.594]	3.942***	[2.951,5.265]
Never, almost never	1.806**	[1.170,2.788]	3.291***	[2.116,5.116]	1.375	[0.847,2.234]	27.93***	[16.61,46.98]
Where child usually eats main meal *(Kitchen, dining room, living room-dining room)*								
Other room	1.249	[0.984,1.585]	0.924	[0.723,1.180]	1.379*	[1.069,1.778]	1.096	[0.825,1.457]
Days last week that child ate take-away meal (e.g. fish & chips) *(Once or less)*								
Twice or more	2.238*	[1.133,4.421]	1.246	[0.713,2.180]	1.536	[0.791,2.984]	1.077	[0.502,2.309]
Days last week child ate main meal made using fresh ingredients *(5-7 times)*								
4 times or less	1.492**	[1.177,1.892]	1.562***	[1.281,1.904]	1.323*	[1.035,1.691]	1.034	[0.797,1.341]
"Meal-times are a rush" *(Never/Occasionally)*								
Quite often/mostly	0.864	[0.641,1.165]	1.272	[0.969,1.671]	1.078	[0.788,1.474]	1.506**	[1.129,2.009]
"Meal-times give us time to talk to each other" *(Never/Occasionally)*								
Quite often/mostly	0.638**	[0.460,0.884]	0.719*	[0.536,0.965]	0.720*	[0.523,0.992]	0.914	[0.684,1.221]
"Meal-times gives are enjoyable for everyone" *(Never/Occasionally)*								
Quite often/mostly	0.863	[0.638,1.168]	0.950	[0.738,1.222]	0.916	[0.685,1.224]	0.532***	[0.402,0.704]
How easy or difficult is child to feed? *(Very/fairly easy)*								
Neither easy nor difficult	1.180	[0.886,1.571]	1.746***	[1.321,2.306]	1.234	[0.923,1.651]	omitted	
Fairly/very difficult	1.142	[0.826,1.580]	2.900***	[2.185,3.849]	0.880	[0.671,1.153]		

[Table 34 continued]

Sample child's birth order *(Subsequent birth)*								
First birth	0.591***	[0.476,0.734]	0.771*	[0.630,0.942]	0.814*	[0.682,0.970]	0.722**	[0.567,0.921]
Gender *(Male)*								
Female	0.998	[0.804,1.238]	0.827	[0.677,1.011]	0.977	[0.816,1.169]	0.926	[0.721,1.190]
Mothers Education (SW3) *(Degree or equivalent)*								
Vocational qual/s below degree	1.955***	[1.428,2.676]	1.374**	[1.093,1.727]	1.404**	[1.124,1.753]	1.283	[0.998,1.650]
Higher grade or equivalent	1.212	[0.743,1.975]	1.210	[0.776,1.886]	1.220	[0.821,1.811]	1.432	[0.959,2.139]
Standard grade or equivalent	2.135***	[1.619,2.814]	1.159	[0.856,1.568]	1.538*	[1.100,2.152]	1.425	[0.981,2.070]
No qualifications	1.972**	[1.271,3.058]	1.152	[0.805,1.648]	1.023	[0.678,1.543]	1.405	[0.847,2.329]
Mothers age (in years)	0.977*	[0.956,0.998]	1.007	[0.991,1.023]	1.023*	[1.001,1.046]	0.992	[0.972,1.012]
Mother's ethnic background *(Other)*								
White	1.241	[0.716,2.151]	1.605	[0.972,2.648]	0.803	[0.511,1.260]	0.899	[0.432,1.871]
Family status (SW3) *(Couple household)*								
Single parent household	1.250	[0.920,1.698]	1.046	[0.785,1.393]	0.865	[0.683,1.096]	1.154	[0.796,1.673]

1.Data filtered for single-births and cases were mother was biological mother of child. N values are based on un-weighted data**.** Significance levels: * p <0.05, ** p <0.01, *** p<0.001

2.Mod 1: Nag. R2 = 0.15, Goodness of Fit p=0.3026, Standardized Residuals <3, High leverage = 20 obs., Tolerance > 0.200

3.Mod 2: Nag. R2 = 0.19, Goodness of Fit p=0.3560, Standardized Residuals <3, High leverage = 18 obs., Tolerance > 0.200

4.Mod 3: Nag. R2 = 0.05, Goodness of Fit p=0.1560, Standardized Residuals <3, High leverage = 8 obs., Tolerance > 0.200

5.Mod 4: Nag. R2 = 0.30, Goodness of Fit p=0.1961, Standardized Residuals <3, High leverage = 53 obs., Tolerance > 0.200

Discussion

Nutritional Trajectories Over Time

The results exploring the relationships between eating habits of children from infancy to early childhood indicated that children do appear to start off on, and stay on, different nutritional trajectories from birth. That is to say that children who experience optimal nutrition at birth and in infancy, by being breastfed and not being introduced to solids too early, are more likely to maintain an optimal nutritional trajectory in their toddler years, by eating a healthier diet. The results showed that breastfeeding children and delaying the introduction of solids until after 4 months, are both linked to positive outcomes in children's subsequent diets. More importantly, there appears to be an *amplified* association between long breastfeeding durations and delayed weaning, with children's subsequent nutritional outcomes, supporting the hypothesis that consistent optimal nutritional choices in infancy are important for children's subsequent eating habits and health.

The reviewed empirical literature provided evidence of how children's food preferences and their experiences of breastfeeding and weaning in infancy are correlated. Existing studies argued that the varying flavours of maternal milk prepare breastfed babies for a more varied solid diet, while formula-fed babies accustomed to an unvarying milk flavour are more likely to be apprehensive in trying different foods as toddlers (Mennella and Beauchamp, 1991; Sullivan and Birch, 1994). The reviewed evidence also suggested that there was a link between the foods used for weaning infants onto a solid diet and children's subsequent food preferences (Gerrish and Mennella, 2001; Mennella et al., 2001; Northstone et al., 2001). While the analysis in this chapter was unable to look at foods used during weaning, the results regarding the *timing* of weaning and subsequent dietary preferences confirm the importance that children's experiences of weaning have for their subsequent diet.

While the findings point to different nutritional trajectories which children seem to follow, the data used for the analysis are unable to indicate whether these trajectories reflect a) an underlying process of 'taste conditioning' which affects children's sensory experiences of food, or b) a consistent strategy which mothers and fathers adopt with regard to feeding decisions for children. It may be that the results merely indicate that different mothers consistently adhere to different feeding strategies with their children. Thus, mothers who feel it is important to breastfeed, are also more likely to feel it is important to delay weaning, and equally important to feed a toddler a varied and healthy diet. The spotlight would fall on the feeding intentions of the mother, rather than the food preferences of the child.

However, some research has shown that children are not passive recipients when it comes to eating and even young children can successfully resist foods which they do not want to eat, and maternal power over child nutrition is ultimately not absolute (Brewis and Gartin, 2006; Cooke et al., 2003). Thus, it is likely that toddlers who eat healthier do so both because their mothers give them little choice to do otherwise, and because they have grown accustomed via previous food-experiences to be nutritionally open-minded to a variety of foods.

Nurturing Food Preferences through Family Meal Habits

The analysis exploring the relationships between family meal habits and children's diets at the age of 58 months indicated the communal patterns of eating are significantly related to children's nutritional habits. The results indicated that children who ate the same food as their parents for their main meal were far more likely to be eating healthier overall, and this was particularly important with regard to increasing children's vegetable consumption. However, it appeared that children who did not eat the same food as parents were more likely to be described by mothers as fussy eaters. But it is possible that children are caught in a loop whereby they have grown to be fussy because they are not sufficiently exposed to the more varied diet eaten by parents, which only leaves their 'food fussiness' unchallenged as they grow older.

As the reviewed empirical literature indicated, children who eat the same food as mothers are more likely to consume more vegetables (Cooke et al., 2003; Gable and Lutz, 2000), and it has been established that repeated exposure to new foods is key in getting children to like them (Wardle et al., 2003). Thus, fussy eaters who are not eating the same food as parents, and presumably eating a less varied diet, are unlikely to become more open-minded with regard to food without being repeatedly exposed to and encouraged to try different foods. It is possible that the socially constructed idea that some children are 'fussy eaters' may discourage some mothers from persevering with their efforts of getting children to eat healthier. The idea that some children are innately 'fussy' perhaps overshadows the extent to which parents are able to shape children's food preferences by sharing with them the food they themselves eat during meal-times. Thus, it is important that parents become aware of how they can lead their children by example, encouraging them to eat the same food as other family members in order to develop a taste for healthier foods early on in life.

While eating the same food as parents was an important determinant of children's dietary habits, other meal habits, such as meal timing and what rooms children ate in were also linked to children's diets. The results showed that children who had regular meal-times were more likely to eat a healthier diet. The data also indicated that children who ate in areas designated specifically for food consumption, such as kitchens or dining areas, had healthier diets than those who ate in rooms not designated for food consumption, such as the living room or the bedroom. Previous research has shown that children who eat their main meal in front of the television have been known to consume fewer vegetables (Coon et al., 2001). The results reiterate the role that that ritual aspects of food consumption play in the overall nutritional habits of families and their children.

The results presented in this chapter seem to confirm the existing evidence on the relationship between shared meal-times, regular meal schedules, and eating in dining areas with children's dietary quality (Brewis and Gartin, 2006; Cooke et al., 2003;

Roblin, 2007). It is worth questioning, however, why these aspects of meal-times seem to be associated with differences in children's dietary quality. It may be that parents who eat with their children, in designated dining areas, and usually at a set time, are better able to control and monitor their children's food consumption. Thus, they would be better able to offer continuous encouragement in making children eat foods they may initially reject. It may also be that families who have an irregular and impromptu meal schedule, or eat meals in non dining areas (possible in homes where space is limited), are families where children are less likely to be offered a variety of vegetables in the first place. Perhaps it is not the irregular meal schedule or not eating in a dining area per se which are detrimental to health but the fact that these habits traditionally go hand in hand with poorer food choices in the first place.

Children's diets were also shown to be affected by the types of meals children would eat. Eating take-away meals relatively often was linked to children having less healthy diets. On the other hand, children who often ate meals prepared with fresh ingredients were more likely to eat more vegetables and not eat unhealthy snacks between meals. The reviewed literature had indicated that parents from less advantaged backgrounds are less likely to give vegetables to their children because in the fear that vegetables may be rejected, parents prefer to spend their limited budget on foods which they know children will eat (Dobson et al., 1994; Dowler et al., 2001). Also, some parents lack the appropriate cooking skills and basic knowledge about food which would enable them to prepare meals with fresh ingredients (Department of Health, 2008b; Marryat et al., 2009; Wrieden et al., 2007) and they may prefer to go for 'tried and tested' options, such as ready-made meals or take-aways which they know their children will eat. Preparing meals with fresh ingredients allows parents more control over what they choose to feed their children. Cooking could also enable children to get involved in the process of food preparation, and prepare them to be more open-minded in trying unfamiliar foods. Ultimately, most typical take-aways are unlikely to qualify as optimal nutrition for children, or adults, and if more parents had the skills and resources necessary to feel that they could *choose not* to opt for the take-away option, they would be better able to feed their children, and themselves, with healthier foods.

This chapter focuses not only on the more technical and spatial elements of meals, but also on the social quality of meal-times. The reviewed literature had suggested that meal-times are often stressful, especially when parents are in constant battle with children over what foods they should eat (Brewis and Gartin, 2006; Hoerr et al., 2005). Thus, parents may at times feel they simply have to let children win the tug of war for the sake of family peace. The results showed that parents who described their meal-times as 'a rush' were more likely to have children described as fussy eaters. In light of the reviewed literature, it can be hypothesised that parents who find meal-times stressful are more likely to give in to children's food tantrums, and these children are therefore more likely to remain picky with regard to eating new foods. On the other hand, parents who viewed meal-times as opportunities for quality time with the family, had children who were more likely to be eating healthier foods.

Ultimately, mothers who have come to a point where their children will eat what they are given, clearly have fewer reasons to find meal-times unpleasant, while those who have to enter into a negotiation with their child at every meal are unlikely to find shared meal-times rewarding. The real issue is identifying how and when children become picky or open-minded with regard to food, as it is hypothesised that both attitudes to food are learnt and nurtured in children through shared food experiences. The evidence seems to suggest that even before turning 5 years of age, children's meal patterns and related food preferences are becoming established. Attempting to alter picky eaters' attitudes at this age is likely to be more challenging and resource intensive than it would be to socialise a younger child into becoming open minded in the first place with regard to food. In order to nip the development of children's poor eating habits in the bud, it is important to address the very early years, starting in infancy. *Preventing* unhealthy eating habits from developing is likely to be easier and more efficient than *changing* food preferences which have become well engrained. This has important implications for public health policy which are discussed later in this chapter.

Reflections on Social Theory

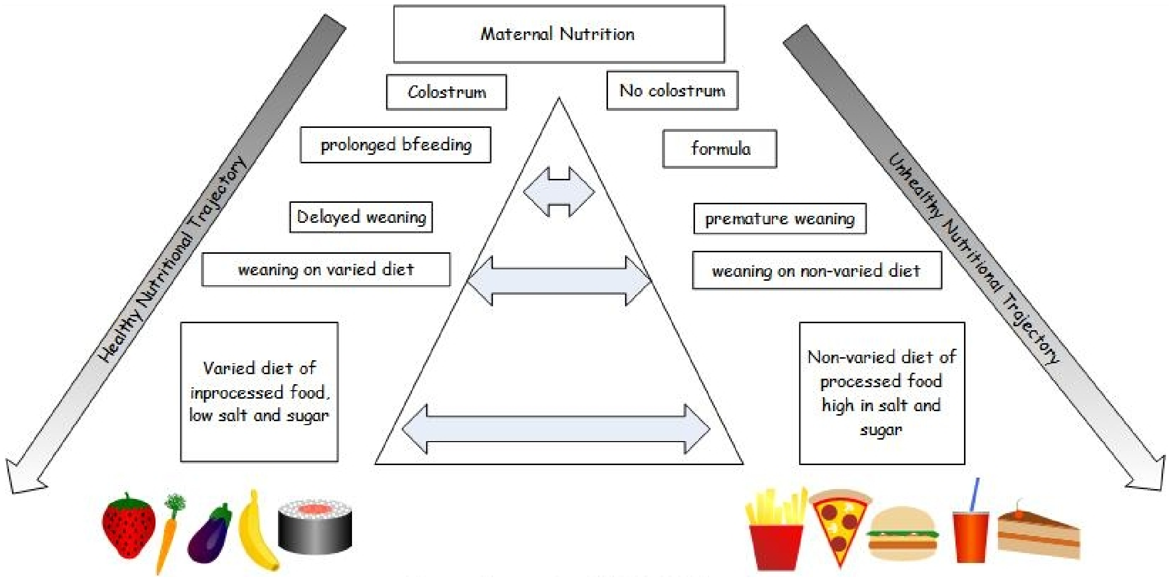
Nutritional Trajectories

Reflecting back upon the theoretical literature which informed the research enquiry it seems that the present research findings can be understood through the conceptual tools provided in relevant social theory. The findings focusing on children's nutritional trajectories over time seem to agree with the idea that some children are being nurtured into developing a preference for healthy eating by being repeatedly exposed from birth to optimal nutritional experiences, such as breastfeeding and delayed weaning. On the other hand, other children perhaps become predisposed to being afraid of a varied diet, by having grown up with a more restricted spectrum of flavours, as a result perhaps of not having been breastfed or having been weaned on an unvarying diet. Infants play a relatively passive role on decisions regarding their diets but their future food preferences are affected by their early food experiences.

Given the findings in this thesis, and the existing empirical research, there seems to be evidence linking early childhood experiences of food and feeding and subsequent food preferences in later childhood. The absence of good quality longitudinal data which trace children's eating experiences from birth onwards may be part of the reason why the development of children's nutritional habits over time has been relatively under-researched and under-theorised. Thus, a general theoretical typology for children's nutritional trajectories is proposed. This typology aims to capture the dynamic process through which children come to inherit, develop, and learn to acquire a *taste* and predisposition for healthy or unhealthy diets. Figure 13 illustrates the proposed typology which captures the concept of differential nutritional trajectories.

Based on empirical evidence on the importance of the in utero period in influencing infants' *innate* preferences for food (Beauchamp and Mennella, 2009), the proposed typology identifies maternal pregnancy as the starting point of children's nutritional trajectories, during which period the food choices made by the mother during the

Figure 13 Theoretical typology for nutritional trajectories in childhood



course of pregnancy affect the food preferences which infants will subsequently be born with. This stage is followed by children's first exposure to food after birth, where children who are given the colostrum are contrasted to children who are not breastfed at all as being on the two diametrically opposite sides of a nutritional trajectory spectrum. The subsequent step in the model points to the importance of breastfeeding, which is contrasted to formula feeding of infants. The dynamic and longitudinal nature of the proposed model highlights how there are both immediate and prospective benefits of breastfeeding infants. The prospective benefits relate to children acquiring a greater predisposition for liking a varied diet in later life after feeding on breast milk in infancy. This is because infants are exposed to a variety of flavours transferred to the maternal milk through the mother's diet and are as a result conditioned into growing up as more open-minded children with regard to eating a varied diet (Mennella and Beauchamp, 1991; Mennella et al., 2001).

Prolonged breastfeeding and delayed weaning are interdependent, and children who are weaned prematurely do not benefit from prolonged exposure to breast milk. More importantly, the foods used during the weaning period have been shown to influence children's subsequent feeding difficulty at 6 and 15 months (Northstone et al., 2001) and their dietary preferences at 7 years of age (Coulthard et al., 2008), with research showing the importance of exposing children to lumpy, non-pureed food. In the proposed theoretical typology, children on optimal nutritional trajectories are likely to be exposed to a variety of foods, as well as food textures during the weaning period, as opposed to those on less optimal trajectories, who may be fed a more monotonous diet, with a large reliance on pureed homogenised foods.

After children move on to exclusively eating a diet of solid foods, those who have embarked on a healthy nutritional trajectory will be more likely to be given healthier food choices during the early childhood years. But crucially, as a result of their early exposure to a variety of flavours experienced in the womb, through breast milk, and through the introduction of varied foods and food textures in the weaning period, children on healthy nutritional trajectories will have an innate and learned predisposition to *liking* and *accepting* healthy foods during their childhood years. At the other end of the spectrum, children with less healthy nutritional trajectories at birth may be more likely to be apprehensive of trying foods with unfamiliar and new flavours, and be more likely to reject a varied diet in the childhood years. The model is open-ended, with an implicit assumption that the nutritional trajectories which children have embarked on from the pre-partum period, through infancy and early childhood will define the way these children eat as adolescents and adults.

The proposed theoretical typology relies on two nutritional experiences which represent the two extreme ends of an actual spectrum of varied food trajectories which children are likely to embark on in life. In fact, many children might zig-zag across the spectrum, with one unhealthy food experience at one time point being followed by a healthy food experience at a subsequent point. While the theoretical typology is structural and rigid, that is not to say that real eating habits are rigid too. There is likely to be a great variety in children's real nutritional trajectories, with various stories of fussy eaters who grow up to become food enthusiasts. On an aggregate level, however, the evidence seems to suggest that healthy food experiences in infancy accumulate and predict positive subsequent food preferences.

Perhaps children who embark on a primarily healthy nutritional trajectory in infancy are more likely to stay on it through childhood and later adult life.

On a final note, the trajectories are conceptualised and illustrated as outward facing, whereby the distance between children's eating habits at each end of the spectrum grows larger, as children grow older. The hypothesis is that as children remain on diametrically opposed nutritional trajectories, their food preferences become *increasingly* harder to change, and the distance longer to traverse, the longer they stay on either trajectory. Thus, children who have benefited from optimal maternal nutrition in the pre-partum period, prolonged breastfeeding, and optimal weaning and food choices in the early years will be less tempted by turkey twizzlers at school, or by chicken nuggets in adult life. On the other hand, the longer children stay on unhealthy nutritional trajectories, the harder it may become for them to adopt healthier diets in later childhood or adult life. It follows that diverting an individual from a negative to positive nutritional trajectory is likely to be easier and less resource intensive the earlier on this happens in life.

Meal Rituals

As infants grow into toddlers and gradually start displaying agency over their own food consumption, meal-times have the potential of becoming a minefield for maternal stress and child discontent. Toddlers' experiences of meals and eating within the context of family life help to attribute social meaning to food. Ultimately, children represent ongoing 'body projects' (Giddens, 1991) which are exposed to a process of continuous regulation and civilisation by parents (Elias, 1982; Turner, 1987; Turner, 1992). Part of this civilisation process involves parents knowingly or unknowingly socialising their children into adopting their own socially constructed meanings to food and eating (Mead, 1949). The family meal, or the absence of it, is one realm through which this socialisation can occur. This ground work done in the early years contributes to defining children's 'techniques of the body' (Mauss, 1973 [1935]), and the dietary habits which they will keep through to later childhood and adult life.

It would be simplistic to presume that children who grow up with a preference for unhealthy foods are being driven by ‘innate’ bodily urges, and have failed to be nurtured into ‘eating for health’. Rather than invoking the classic nature vs. nurture dichotomy (Moore, 2003), it could be argued that differences in children’s dietary habits are a result of a nurture vs. nurture dichotomy. That is to say that children acquire a *taste* (Bourdieu, 1984) for either healthy or unhealthy food through a process of socialisation which commences at birth, if not before that, and continues to shape their preferences for certain foods through to their adult life. Whether mothers nurture children into preferring healthy or unhealthy foods will depend greatly on maternal perceptions of *food risks* (Beck, 1992) and the extent to which mothers feel a moral obligation to teach children to pursue good health through nutrition (Wall, 2001). As was shown in the preceding chapters, maternal perceptions of risk are influenced in large part by maternal socio-economic and primarily educational characteristics which capture the underlying human capital which colours how parents come to conceptualise food, eating and health (Becker, 1993; Bourdieu and Passeron, 1977).

Reflections on Social Policy

The findings discussed in this chapter point to the importance of addressing the nutritional habits of children in the very early years. Needless to say, initiatives focusing on breastfeeding at an international level (European Commission, 2004; WHO, 1990; WHO, 2003b) as well as at a Scottish level (Scottish Government, 2008b), and initiatives focusing on nutrition of school-aged children at an international level (WHO, 2004) and at a Scottish level (Final Report of the Expert Panel on School Meals, 2003; Scottish Executive, 2003c) have put infant and child nutrition firmly on the map of the broader public health agenda.

However, the findings highlight that important eating habits develop from birth and continue to develop during infancy and the early years, meaning that by school-age, children have already learned and identified themselves with certain eating habits. The current policy landscape leaves room for a greater focus to be given to nutrition during the early years period. In Scotland, steps in the right direction have been made through initiatives such as the *Nutritional Guidance for Early Years: Food choices for children aged 1-5 years* document. This announced that the Hungry for Success initiative would be extended to pre-school and childcare centres (Scottish Executive, 2006b), meaning that the food offered to toddlers in care settings would be regulated. However, this still does not address the diets of toddlers as they develop within the context of family life and family food habits.

Across the border, the *Healthy Child Programme – Pregnancy and the First Five Years* launched through the *Healthy Weight Healthy Lives* strategy (Department of Health, 2008a; Shribman and Billingham, 2009) has set forth a novel approach in tackling child nutrition by stressing the importance of addressing the diets and health of infants and toddlers in the early years while also addressing the diets and health of their families. The *Healthy Child Programme* offers a universal programme of screening tests, immunisations, developmental reviews for children along with "information and guidance to support parenting and healthy choices" (Shribman and Billingham, 2009). A caveat of the programme is that the implementation of the programme lies solely in the hands of local partners who commission and provide the service. This could lead to unequal service provision at a national level. The other potential caveat is that the implementation of the programme relies on using the service delivery pathways which are already in place, including midwives, health visitors, nurses, and GP's. However, if some groups of mothers are less welcoming to the intervention of health professionals, as was discussed chapter 6, it may be that a new and improved strategy does not get through to the mothers who would benefit from it the most, because the delivery method, rather than the service offered, does not suit the needs of those mothers.

One of the key arguments presented in this chapter is how children's nutritional experiences at birth and infancy may have a cumulative effect on their subsequent dietary habits. Children who commence with optimal nutrition are more likely to stay on positive nutritional trajectories through infancy and the early years. Given that children's eating habits manifest a certain level of continuity, perhaps policy services aimed at children and their families could reflect a parallel degree of continuity with regard to the process of service delivery. The current service provision system which relies on several different health professionals, responsible for different aspects of children's health in the first 5 years of life, may not offer children and mothers the level of service continuity necessary for mothers to develop a relationship of trust with the health professionals in question.

The findings in this chapter highlighted the importance of family meal-times in enabling parents to lead their children by example in terms of dietary habits. In order to eat healthily, children must be offered healthy food options, but the context in which this food is offered to children is able to affect how children react to the foods given. Existing initiatives have focused extensively on nutritional guidelines concerned strictly with food in and of itself, with recommendations on food consumption limits (e.g. 2 grams of salt for children up to 3 years old) and food consumption targets (e.g. 5-a-day for children aged 5 and over). Considerably less attention has been paid to *how*, *where* and *when* foods are eaten and how these elements relate to the types of foods children eat.

On the one hand, a more comprehensive approach to policy aimed at improving child nutrition could provide mothers with the cooking skills and basic knowledge about food necessary to allow them to feel that they are *capable* of cooking and feeding their children with home-made food. Some mothers lack the self-confidence necessary for this to happen, and they may feel that ready-made meals or fast-food will be superior to anything they are able to make themselves. On the other hand, many mothers could use advice and support on parenting strategies, rather than on what constitutes a healthy meal. Many mothers who know what healthy eating is in theory, do not have the parenting skills necessary to be able to engage in fruitful negotiations with demanding toddlers and put such theory into practice.

Ultimately, however, children will be more likely to eat healthy food if mothers lead by example. Despite the fact that the average Scottish diet is not optimal (Wrieden et al., 2006), children who eat the same food as their parents eat healthier food than those who eat a different and separate meal from parents. This stresses the importance of focusing on family eating on the whole, rather than just on children's nutrition. Strategies looking at school nutrition or nutrition for pre-school children in the care setting are able to side-step the importance of family diets on the whole. The missing link in policy on infant and toddlers' nutrition is a focus on the types of foods which families on the whole consume, and the ways in which these foods are consumed in the everyday context of family living.

Conclusion

After taking the reader on a long expedition, this journey now draws to a close. The purpose of this concluding chapter is to summarise the content and findings of this doctoral thesis, and to discuss conclusions of a more general nature which can be inferred from this doctoral research project. More detailed discussions regarding the analyses conducted have been provided with each substantive chapter, and these will not be reproduced here. This chapter concludes with a reflexive account of the research process, and lays out some suggestions for future research.

Summary

A review of empirical research literature looking at children's nutritional habits in the early years and the factors which influence these habits was presented in chapter 1. This was followed in chapter 2 with a review of related international and Scottish developments in public health policy concerned with child nutrition and health. chapter 3 laid out the key theoretical frameworks which informed the analytical enquiry and research questions, as well as the subsequent interpretation of results in the substantive chapters which followed. Chapter 4 provided a thorough overview of the Growing Up in Scotland survey as well as a thorough description of how key analytical concepts were operationalised with the data available in the GUS survey. Four substantive chapters followed drawing on five key research questions which focused on different aspects relevant to the development of children's nutritional habits in infancy and early childhood.

Chapter 5 focused on the first research question which aimed to explore the link between maternal human capital and children's diets in the early years. The concept of human capital used for the analysis amalgamated ideas introduced by Becker (Becker, 1993) and Bourdieu (Bourdieu, 1984) and particular attention was given to how maternal human capital, captured by indicators of maternal occupational classification, maternal education, and household income, were linked to children's nutritional outcomes. The empirical analysis showed that differences in feeding and eating habits for infants and children are socially differentiated among children of parents with different socio-economic and educational profiles. Whilst household income and maternal occupational classification were individually good predictors of children's eating habits, maternal education was a consistently superior predictor of nutritional differences, and children of more educated mothers had healthier diets throughout infancy and childhood.

The superiority of education as an indicator of human capital spurred a discussion about whether Becker's theory of human capital, which stresses the importance of education and training in defining human capital, could be more prominent in sociologically inclined research on human health behaviours. Becker's concept of human capital could complement other theories of capital (Bourdieu 1984) more often encountered in sociological work which do not give education the attention it seems to deserve, at least in this context. With regard to policy, the above findings also pointed to the importance of addressing the fundamental educational, occupational and income-related inequalities prevalent in the Scottish population which have trickle-down effects on the health and nutrition of children and adults. Policy could focus more on addressing these underlying root causes of health inequalities in families and children, possibly by investing in a more comprehensive welfare and economic redistribution system that could promote a more equal distribution of, and access to, human capital in society.

Chapter 5 also looked at the relationship between breastfeeding duration and maternal employment and maternity leave, showing that mothers who stay at home, either because they do not work, or because they work from home, breastfeed for longer, and delaying the return to work facilitated prolonged breastfeeding. A more generous maternity leave scheme then the one currently in place would perhaps be more likely to promote prolonged leave and, in turn, prolonged breastfeeding. Many women do want to return to work, and they should be able to continue to work without feeling that this comes at a cost of any aspirations they may have as mothers.

Thus, more could be done to make work environments more suitable for juggling the demands of both breastfeeding and work (Cooklin et al., 2008; Roe et al., 1999).

The second research question was addressed in chapter 6, which explored whether maternal human capital explained differences in the maternal use of formal and informal sources of healthy eating advice, and differences in maternal attitudes towards the involvement of health professionals in aspects of childrearing and child nutrition. The theoretical framework suggested that mothers from more advantaged backgrounds would be more susceptible to feel the ‘social anxiety’ surrounding the ‘risks’ associated with infant feeding, and eating habits in early childhood (Blum, 1999; Maher, 1992b; Mennell et al., 1992), and more likely to empower themselves with medical knowledge on how make health enhancing food choices (Foucault, 1980). The results showed that mothers rely on a variety of sources of advice, including advice from health professionals, and advice from family and friends and other mothers. More educated mothers were more likely to use all of the informal sources of information explored in the analysis, and particularly more likely to use books and magazines for advice, with the exception that mothers with no qualifications were most likely to use informal advice from family and friends.

Surprisingly, mothers from more disadvantaged backgrounds were more likely to use advice from health professionals. This result appeared to contradict the theoretical framework informing the thesis which suggested that more advantaged social groups would be more open to the intervention of health professionals in aspects of child nutrition and rearing. However, this result may reflect the targeted nature of health service provision in Scotland, where health professionals are encouraged to focus their efforts on more ‘at risk’ groups. Yet, paradoxically the results showed that more disadvantaged mothers were also more likely to fear the interference of health professionals and to have a negative view of their involvement in childrearing.

This was flagged as an issue of particular policy concern, where disadvantaged families are targeted for support by health professionals, but these families are simultaneously welcoming and apprehensive about the involvement of such professionals in childrearing. Mothers from disadvantaged backgrounds may be actively targeted by the health service, but more could be done to break the barrier of mistrust that some groups of mothers have with regard to the involvement of health professionals in childrearing. Also, the underlying assumption of public health initiatives which aim to *educate* mothers about food and health, is that mothers will make the *right* choices if they are properly informed about the consequences of poor diets. But the findings confirm that parents from better-off backgrounds are both more likely to implement information about healthy eating in general and more likely to have a positive view of health professionals' involvement in childrearing. Information-based public health initiatives will most likely have a smaller impact on those more at-risk children living in families with less socio-economic and educational resources. The key issue for policy makers is identifying a format for the provision of support which mothers from more disadvantaged backgrounds can trust and actually implement.

The third research question looked at maternal knowledge about child nutrition and maternal use of different sources of advice on child nutrition in relation to infants' and toddlers' diets. This question was addressed in chapter 7 and was heavily nuanced by a broader interest in undertaking research which can reflect on existing social policy initiatives. The results showed that there were positive associations between infant diets and maternal use of advice from health professionals. Attending antenatal classes, and receiving advice from a midwife and health visitor were all factors which were associated with children's infant feeding outcomes, independently of other family or child characteristics known to affect infant nutrition.

With regard to toddlers' diets, the results showed that using health professionals' advice was not linked to better diets in toddlers. But given that health professionals are primarily concerned in supporting families from disadvantaged backgrounds, their impact on toddlers' diets could be masked by the fact that children who are more likely to benefit from support by health professionals have poorer diets in the first place. In terms of informal sources of advice, mothers who used the internet and those who used books and magazines for advice had children eating healthier diets, although as previously stated, it was primarily mothers from more advantaged backgrounds who used these advice sources in the first place. Children of mothers with more human capital could stand to benefit from cumulative advantages of direct and indirect positive effects that maternal human capital has on maternal knowledge of healthy eating and children's eating habits.

In line with Foucauldian ideas of power-knowledge, mothers who know more about healthy eating are able to put such healthy eating knowledge into practice. So there does appear to be support for a policy rationale which assumes that food choices simply need to be *informed* in order to be *healthy* choices, despite the existing critiques to this approach (Carter, 1995; Gillies, 2005; Wall, 2001). Nevertheless, the idea of 'informed choice' which justifies information-based policy initiatives, fails to acknowledge that a lack of resources may inhibit mothers and families from translating healthy eating knowledge into healthy eating practice (Sen, 1984). Perhaps shifting from a rhetoric which responsibilises the individual for making healthy food choices in unhealthy food environments (Garland, 1996; Gillies, 2005; Lang et al., 2009; Wall, 2001), more could be done to responsibilise the production and supply of food to create more favourable food landscapes.

In terms of public health policy, there appears to be evidence of a positive link between knowledge about healthy nutrition and practice of healthy nutrition. This is encouraging news considering that public health policy has been heavily reliant on information-based initiatives. While breastfeeding rates in Scotland are still low relative to other developed nations, there is a positive association between using advice from health professionals on infant feeding and maternal breastfeeding habits. Drawing on this evidence it would be fair to say that recent proposals to scale back the workforce of health visitors and midwives in Scotland would not be advisable if improving infant nutrition is still a priority for Scottish health policy (BBC News, 2010/06/03; Foster, 2008).

The data showed that 6 in every 10 toddlers snack on nutritionally void refined carbohydrates and sugars on a daily basis before they turn 2 years old, highlighting the magnitude of Scotland's child nutrition problem. Strategies which may produce small improvements are welcome, but ultimately, a complete overhaul of the food culture and food supply in Scotland might be necessary in order to achieve substantial change in the diets and health of young children and their families. Many mothers lack the basic food processing and food preparation skills necessary to be able to make healthy meals from healthy foods, and they would stand to benefit from acquiring the basic cooking skills and self-confidence necessary for them to be able to take agency over their own and their children's diets.

Finally, changing the behaviours and choices of individuals and families could be better supported with more ecological measures which aim to change the obesogenic environments which families face. Taxation applied to the consumption and production of food is one way to achieve this, and money raised through these measures could be used to subsidise healthier foods (Caraher and Cowburn, 2005; Lang et al., 2009; Leicester and Windmeijer, 2004; McColl, 2009).

Chapter 8 addressed the fourth and fifth research questions. The fourth research question aimed to explore how children's nutritional experiences in infancy relate to their eating habits in early childhood. The empirical analysis indicated that children who were breastfed, and children who were weaned after turning 4 months, were more likely to have healthier diets as they approached their 2nd birthday. More importantly, there was an *amplified* association between long breastfeeding durations and delayed weaning, and children's subsequent nutritional outcomes. This lends support to the hypothesis that consistently optimal nutritional choices at birth and in infancy contribute positively towards children's subsequent eating habits. These results largely confirmed the existing evidence in this field (Mennella and Beauchamp, 1991; Sullivan and Birch, 1994), but given the primarily medical nature of existing empirical research, children's eating habits remain relatively under-theorised.

Thus, a theoretical typology of children's nutritional trajectories was proposed, capturing how children inherit and develop a *taste* for healthy food in childhood. The typology rests on two contrasting nutritional trajectories at two extreme ends of a spectrum of varied food trajectories which children may follow. The optimal trajectory involves optimal maternal nutrition in pregnancy, prolonged breastfeeding, delayed weaning on a varied diet in infancy, and a varied diet with minimal processed foods, sugar and salt in early and later childhood. The unhealthy trajectory involves poor maternal nutrition in pregnancy, no breastfeeding, premature weaning on an unvarying diet of processed foods, and a diet of processed foods high in salt and sugar throughout the childhood period. Admittedly, real eating habits will typically fall between the two extremes of this spectrum, perhaps swaying from one end to the other as children grow. But the typology aims to capture how healthy food experiences early in life have a cumulative positive effect on subsequent food preferences in later life.

The fifth research question focused on the extent to which meal habits of the whole family explain how children develop nutritional preferences in the early years. The empirical evidence indicated the communal patterns of eating play an important role in children's dietary quality. Eating the same food as parents, eating at regular times and eating in areas designated specifically for food consumption, were meal habits associated with a healthier diet in children aged just under five years of age. Children's diets were also affected by the types of meals they would eat, with eating take-away meals relatively often being linked to children having less healthy diets, and eating meals prepared with fresh ingredients being associated with children having healthier diets. Also, parents who described meal-times as opportunities for family quality time were more likely to have children eating healthier foods. This largely confirmed empirical research based on samples of older children looking at the importance of meal habits on children's dietary quality (Brewis and Gartin, 2006;

Cooke et al., 2003; Hoerr et al., 2005; Roblin, 2007). Perhaps it is not the meal habits per se which are detrimental to diets but the fact that these habits traditionally go hand in hand with poorer food choices in the first place, as a result of factors which influence both meal content and meal ritual.

Nevertheless, the analysis controlled for factors known to influence family meal habits and children's diets, and the results point to a positive link between the shared meal experience and children's food consumption. Perhaps shared meals provide a daily opportunity to encourage and socialise children into eating healthier foods. Children acquire a *taste* (Bourdieu, 1984) for either healthy or unhealthy food through a process of socialisation which commences at birth, if not before that, is reinforced in the early years and continues to shape their preferences for certain foods through to their adult life. Children's continuously evolving eating habits reflect the ongoing development of their 'body projects' (Giddens, 1991). Particularly in early childhood, these 'body projects' are subjected to parental regulation and civilisation (Elias, 1982; Turner, 1987; Turner, 1992), as children are socialised into adopting parental socially constructed meanings of food and eating (Mead, 1949). The family meal, or the absence of it, is one realm through which this socialisation can occur.

Several reflections on policy were made drawing on the above findings. Firstly, there is room for a greater focus to be given to nutrition during the early years period. While steps in the right direction have been made through initiatives which aim to regulate the food offered to infants and toddlers in care settings, these initiatives do not address the diets of toddlers as they develop within the context of family life and family food habits. There is evidence to suggest that poor eating habits have a cumulative effect on children's subsequent food preferences. Thus, preventing unhealthy eating habits from developing, by addressing the nutrition of babies, infants and toddlers, is likely to be more effective than changing food preferences which have become well entrenched in older children who may have stayed on unhealthy nutritional trajectories for longer.

The findings in this chapter highlighted the importance of family meal-times in enabling mothers to lead their children by example in terms of dietary habits. Even before turning 5 years of age, children's eating habits are becoming established. Existing initiatives have focused extensively on nutritional guidelines and recommendations on food consumption limits and food consumption targets. Considerably less attention has been paid to *how*, *where* and *when* foods are eaten and how these elements affect the types of foods children eat. Encouraging children to follow the maternal role-model is shown to be linked to healthier diets. But this can only be the case if parents are eating healthy food in the first place, stressing the importance of focusing on family eating on the whole, rather than just on children's nutrition. Strategies addressing school nutrition or pre-school nutrition are able to side-step the family diet but there seems to be a need for policy on infant and toddlers' nutrition which focuses on the *types* of foods which families on the whole consume, and the *ways* in which these foods are consumed in the everyday context of family living.

Final Reflections

Maternal Education and Health Behaviours

A key theme emerging from this doctoral research regards the usefulness of maternal education as an indicator used for capturing the distribution of human capital as a latent variable driving differences in health behaviours of women and mothers. Issues of collinearity that may arise when using different indicators of a latent human capital variable have been discussed (Krieger et al., 1997; Liberatos et al., 1988) and it has been suggested that different indicators may be less or more appropriate depending on the context of the research setting and the nature of the participants (Geyer et al., 2006). It could be argued that while indicators such as income, occupational characteristics and educational qualifications are often used interchangeably as indicators of a latent human capital (Geyer et al., 2006), research on health behaviours of women and mothers may be better able to control for the effect of latent human capital by controlling for maternal educational qualifications.

The superiority of maternal education as an indicator of maternal human capital may be in part related to the fact that women are more likely to suffer downward occupational mobility in conjunction with childbirth (Macran et al., 1996; Scott et al., 2008). From the perspective of survey research, mothers may be ‘relocated’ to a different category on an occupational classification scheme as a result of this downward mobility linked to childbirth, while their inherent human capital remains relatively unchanged, at least in the shorter term. On the other hand, data collected on maternal educational qualifications is not subject to such variability, and possibly better able to capture a latent human capital variable than maternal occupation. Finally, in research ultimately concerned with the development of infants and young children, indicators of human capital based on the mother, rather than the father, may be more appropriate, seeing as mothers are usually the dominant figure in child rearing (Geyer et al., 2006; Krieger et al., 1997).

However, it may be worth to consider educational qualifications in a different light. As has been discussed, educational qualifications may simply be flagging a pre-existing pattern of social stratification driven by other factors external to those educational qualifications themselves. As Sullivan (2002) suggests in a criticism of Bourdieu’s (1984) discussion of education as a component of cultural capital, it is unclear whether formal education is to be seen as a mechanism which reproduces pre-existing social inequalities, or whether formal education can help to eradicate such inequalities. Becker’s (1993) understanding of education is rather different, since he suggests that investing directly in formal education is a way of investing in human capital. With regards to the findings regarding the use of healthy eating information, it could be argued that maternal educational qualifications predict use of healthy eating information because having participated in formal education teaches individuals to appreciate, use, search for and apply such information in everyday practice. It could be that maternal education has a two-level effect on maternal use of information, both as an indicator of a latent human capital variable and as an indicator of the effects which formal education have on the way individuals perceive and use health related advice.

Social Theory and Social Policy

The review of policy initiatives touched upon the extent to which policy relies on unidirectional information models to modify human health behaviours (Lang et al., 2009). The utility of some of the products of such initiatives, such as NHS nutrition advice, was discussed in Chapters 6 and 7, and the relative shortage of measures which aim to modify food supply was highlighted (Caraher and Cowburn, 2005; Lang et al., 2009; McColl, 2009). It seems that the use of such measures ignores that patterns of access and use of such advice are socially stratified, and often fail to benefit those groups which are most in need of policy support. As put by Delormier et al. (2009):

> *"Public health lacks theoretical frameworks to guide our understanding of population eating patterns as integrally related to context"(2009:225).*

Perhaps a more extensive application of social theory in the realm of social policy could enable policy makers to tailor policy initiatives to the needs of the target population.

Looking back

In approaching the end of this project, I am able to reflect retrospectively on different aspects regarding the research findings, the research process, and my personal development as a researcher during the last four years. With regard to the research findings, I developed an interest during my participation in undergraduate and postgraduate education in research which aimed to not only describe the world, but also change it for the better. This partly explains why I found my way into studying social policy. Thus, undertaking research which may at least reflect on existing policy, and at best inform future policy, fuelled my interest in this doctoral project. In time , however, I became better able to appreciate the complexities behind evidence-informed policy, and the difficulties behind using knowledge and research in order to improve people's lives. As a result, a feeling of powerlessness sometimes followed.

Given the quantitative nature of my research, I have experienced both the advantages and the challenges of using survey data. There have been several occasions where questions I considered to be important were not asked, or where I would have phrased some of the questions differently. This is particularly true for the indicators of child nutrition which were at times too broad or loosely defined when compared to indicators I could find in nutrition-specific surveys. This frustration was balanced with the satisfaction of being able to explore a wealth of information regarding children's development in relation to child nutrition. Also, the nature of my studentship and my relationship with ScotCen who manage and collect GUS data, allowed me to occasionally be involved, even if only peripherally, in consultations regarding data collection and survey modules for future GUS sweeps.

Decisions I had to make regarding the formulation of analytical models were also difficult. As I was interested in creating findings which could be linked to relevant policy action, I consciously chose to look at predictors of children with poor eating habits, because existing policy initiatives appear to be used as tools to intervene where something is not deemed to be 'working well'. However, this approach may have imbued the thesis with a solemn undertone. Perhaps it would have been better to focus on positive outcomes, and positive eating habits, and conduct an analysis which aimed to illustrate under what circumstances children can thrive. Perhaps this is something I will consider in future research.

Future Research

And so this thesis comes to a finish, telling a contained and controlled story about a research project with a beginning, middle and end. On a personal level, this doctoral research helped to answer many questions, but it also provided the platform for many more questions to be asked. As these children grow, and as more data are collected on their growth and development through the GUS survey, more could be learnt about how their eating habits continue to develop as they enrol in school, and as they develop through childhood and adolescence. For example, data capturing the eating habits of the baby cohort as it turns five years old could be used to reflect on how children's nutritional habits at the age of five relate to those they had at the age of two, and to their prior experiences of breastfeeding and weaning. As several dietary measures are repeated between sweep two and sweep five, fixed and random effects models could be applied to develop a more elaborate longitudinal analysis of change in children's diets over time.

Further analysis could also explore how meal habits for the baby cohort have changed between sweep two and sweep five, and assess the extent to which meal patterns in infancy seem to predict meal habits and food preferences in five year old children. Also, future analysis exploring change in dietary patterns at the age of two and five, could control for more dynamic aspects of parental human capital and, for example, assess whether children in families who experience a fall in income over time also experience a deterioration in dietary quality over time. Finally, the data could be used to explore whether young children consume more sweets when grandparents are more involved in childcare, and whether such children differ in their overall dietary habits to children who spend more time in formal childcare arrangements.

Further research could explore how eating habits in early childhood relate to longer term health outcomes, school achievement or children's behaviour. It would be possible to explore how nutrition in infancy and early childhood relates to children's adiposity at ages four and six, and whether changes in diet relate to changes in BMI over time. The relationships between children's consumption of sweets and fruit and their dental health could also be explored, and dietary habits could be explored in relation to physical and sedentary activities. Finally, with the launch of a new baby cohort in 2010, data on babies born in 2010 could be compared to the data collected for babies born in 2005 so as to explore changes in issues related to children's development during this five-year period.

As suggested, the possibilities to build on the work presented in this thesis are endless. Some of the above ideas have been encompassed in research proposals which are being assessed by funding bodies at the time of writing, which will hopefully enable me to explore some of the aforementioned issues. Thus, declaring this thesis a finished product disguises how the pursuit of related research pathways could help to expand and further develop this doctoral research.

- End -

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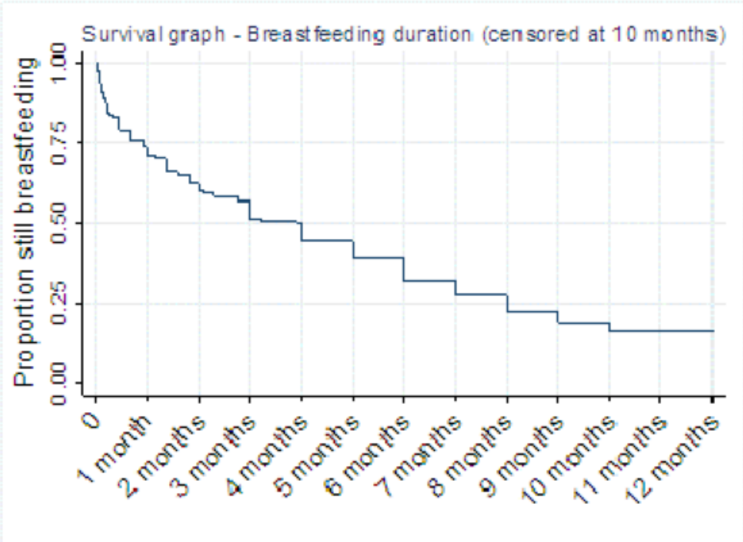
Appendix A

Figure A1 Univariate Analysis –Breastfeeding duration (censored at 10 months)



1.Unweighted N: 3034.
2.Data filtered for single-births and cases were mother was biological mother of child

Table A1 Univariate Analysis – Indicators for infant nutrition

VARIABLE NAME	VARIABLE (un-weighted data)	Baby Cohort %	N
$InfantNutr_1$	**If infant was ever breastfed**		
	Never breastfed	38.3	1934
	Breastfed	61.7	3117
	Total	*100*	*5051*
$InfantNutr_2$	**Breastfeed for 6 weeks (excluding non breastfed children)**		
	Under 6 weeks	28.9	900
	6 weeks or longer	71.1	2217
	Total	*100*	*3117*
$InfantNutr_3$	**Weaning**		
	Weaned at or after 4 months	84.6	4204
	Weaned before 4 months	15.4	768
	Total	*100*	*4972*
BFdur	**Breastfeeding duration (banded)**		
	Never breastfed	39.9	2017
	Under 6 weeks	17.8	900
	6 weeks – under 6 months	18.6	941
	6 months or longer	23.6	1193
	Total	*100*	*5051*

1.Data filtered for single-births and cases were mother was biological mother of child.

Table A2 Univariate Analysis – Indicators for dietary quality (continuous variables)

	Min	Max	Median	25^{th} centile	Poorest Dietary Category	Derived variables
Dietary Quality (Baby Co)	8	37	25	22	Scores 8-22	$DietQual_1$
Dietary Quality (Toddler Co)	5	31	17	14	Scores 5-14	$Diet_1$

1.Data filtered for single-births and cases were mother was biological mother of child.

Table A3 Univariate Analysis – Indicators for dietary quality (categorical variables)

VARIABLE NAME (Baby Co.)	VARIABLE NAME (Toddler Co.)	VARIABLE (un-weighted data)	Baby Co. (SW2) %	Baby Co. (SW2) N	Toddler Co. (SW3) %	Toddler Co. (SW3) N
$DietQual_1$	**$Diet_1$**	**Poor dietary category**	26.5	1154	28.8	646
		Not poorest diet category	73.5	3204	71.2	1597
		Total	*100*	*4358*	*100*	*2243*
$DietQual_2$	**$Diet_2$**	**If child consumes 0 or 1 types of vegetables on a typical day**	28.9	1262	40.6	911
		Child consumes 2 or more types of veg/day	71.1	3101	59.4	1334
		Total	*100*	*4363*	*100*	*2245*
$DietQual_3$	**$Diet_3$**	**If child usually eats unhealthy snacks between meals** [Crisps/Cakes, biscuits/Sweets or chocolate]	59.3	2592	68.8	1546
		Child does not snack on unhealthy foods	40.7	1777	31.2	700
		Total	*100*	*4369*	*100*	*2246*
n/a	**$Diet_4$**	**Child does not eat a variety of things (is a fussy eater)**		n/a	24.5	551
		Child eats most/reasonable variety of things			75.5	1694
		Total			*100*	*2245*

1.Data filtered for single-births and cases were mother was biological mother of child.

Table A4 Univariate Analysis – Indicators of human capital

VARIABLE NAME (Both Cohorts)	VARIABLE (un-weighted data)	Baby Cohort %	Baby Cohort N	Toddler Cohort %	Toddler Cohort N
	SWEEP 1				
Edu	**Mother's education (SW1)**			Not used	
	Degree or Equivalent	28.1	1403		
	Vocational qualification below degree	37.4	1871		
	Higher grade or equivalent	7.4	372		
	Standard grade or equivalent	18.1	905		
	No qualifications	9	448		
	Total	100	4999		
NS-SEC	**Mother's NS-SEC (SW1)**			Not used	
	Managerial and professional	36	1816		
	Intermediate	19.5	983		
	Small employers & self-employed	3.9	196		
	Lower supervisory and technical	6	305		
	Semi-routine and routine	29.8	1503		
	Never worked	4.8	241		
	Total	100	5044		
Income	**Annual household income–Quartiles (SW1)**			Not used	
	Up to £14,999	26	1315		
	£15,000 - £25,999	22.4	1131		
	£30,000 – £43,999	25	1265		
	£44,000 or more	16.3	823		
	Missing data	10.2	517		
	Total	100	5051		
	SWEEP 2				
Edu2	**Mother's education (SW2)**			Not used	
	Degree or Equivalent	29.6	1286		
	Vocational qualification below degree	37.5	1632		
	Higher grade or equivalent	8.5	368		
	Standard grade or equivalent	16.8	729		
	No qualifications	7.6	332		
	Total	100	4347		
NS-SEC2	**Mother's NS-SEC (SW2)**			Not used	
	Managerial and professional	37.4	1636		
	Intermediate	19.9	869		
	Small employers & self-employed	5.3	233		
	Lower supervisory and technical	5.7	247		
	Semi-routine and routine	28	1223		
	Never worked	3.7	161		
	Total	100	4369		
Income2	**Annual household income–Quartiles (SW2)**			Not used	
	Up to £14,999	22.7	990		
	£15,000 - £25,999	21.4	933		
	£30,000 – £43,999	28.5	1243		
	£44,000 or more	22.1	964		
	Missing data	5.5	239		
	Total	100	4369		

(Table A4 continued)

	SWEEP 3				
Edu3	**Mother's education (SW3)**				
	Degree or Equivalent	31	1256	31.2	698
	Vocational qualification below degree	38.5	1557	38.3	858
	Higher grade or equivalent	8.1	329	7.1	159
	Standard grade or equivalent	15.5	627	14.9	334
	No qualifications	6.9	279	8.5	190
	Total	*100*	*4048*	*100*	*2239*
NSSEC3	**Mother's occupational classification (SW3)**				
	Managerial and professional	38.4	1556	37.6	843
	Intermediate	19.9	806	18.1	407
	Small employers & self-employed	6	242	5.7	128
	Lower supervisory and technical	5.6	227	5.7	127
	Semi-routine and routine	27.3	1109	29.9	671
	Never worked	2.8	115	3	68
	Total	*100*	*4055*	*100*	*2244*
Income3	**Annual household income–Quartiles (SW3)**				
	Up to £14,999	18.7	757	17.5	392
	£15,000 - £25,999	20.3	822	20.5	461
	£30,000 – £43,999	28.4	1153	27	606
	£44,000 or more	26.3	1065	27.6	619
	Missing data	6.4	258	7.5	168
	Total	*100*	*4055*	*100*	*2246*

1.Data filtered for single-births and cases were mother was biological mother of child.

Table A5 Univariate Analysis – Indicators for child and parent characteristics

VARIABLE NAME	VARIABLE (un-weighted data)	Baby Cohort %	Baby Cohort N	Toddler Cohort %	Toddler Cohort N
Sex	**Child's gender (SW1)**				
	Male	51.4	2596	51.4	1414
	Female	48.6	2455	48.6	1338
	Total	100	5051	100	2752
BWeight	**Birth weight (SW1)**				
	Birth weight not low	94.2	4752	5.8	158
	Low birth weight	5.8	293	94.2	2586
	Total	100	5045	100	2744
Par	**Sample child's birth order (SW1)**				
	First birth	48.9	2470	46.8	1287
	Subsequent birth	51.1	2581	53.2	1465
	Total	100	5051	100	2752
Age	**Mother's age at birth** [1]				
	Under 20	6.9	347	6.5	180
	20 to 29	40.6	2052	40.5	1114
	30 to 40	49.1	2480	50.2	1381
	40 or older	3.4	171	2.8	76
	Total	100	5050	100	2751
Eth	**Mother's ethnic background (SW1)**				
	White	96.3	4861	96.7	2656
	Other	3.7	187	3.3	92
	Total	100	5048	100	2748
FamStat1	**Family composition (SW1)**				
	Single parent household	19	958	n/a	
	Couple household	81	4093		
	Total	100	5051		
FamStat2	**Family composition (SW2)**				
	Single parent household	16.7	728	n/a	
	Couple household	83.3	3641		
	Total	100	4369		
FamStat3	**Family composition (SW3)**				
	Single parent household	15.9	646	18	405
	Couple household	84.1	3409	82	1841
	Total	100	4055	100	2246
Emp	**Employment status at during pregnancy (SW1)**				
	Full-time, employee	14.8	748	n/a	
	Full-time, self-employed	1	48		
	Part-time, employee	36.5	1841		
	Part-time, self-employed	2.8	142		
	Not in work	45	2270		
	Total				
Matern	**Leave from work - paid & unpaid (SW1)**				
	No leave - up to 1 month	1.7	53	n/a	
	Over 1 month – up to 2 months	2.4	75		
	Over 2 months – up to 3 months	4.1	129		
	Over 3 months – up to 4 months	5.3	164		
	Over 4 months – up to 5 months	10	310		
	Over 5 months – up to 6 months	41.6	1293		
	Over 6 months	25.4	790		
	Still on leave at sweep 1	9.5	296		
	Total	100	3110		

1.Data filtered for single-births and cases were mother was biological mother of child.

Table A6 Univariate Analysis – Indicators for parental knowledge about healthy eating

VARIABLE NAME	VARIABLE (un-weighted data)	Baby Cohort %	Baby Cohort N
Cook	**Cooking knowledge affects what you give child (SW2)**		
	A lot/fair amount	26.3	1149
	A little/not at all	73.7	3214
	Total	100	4363
HEknow	**How much parent knows about healthy eating (SW2)**		
	A great deal	29.8	1301
	Quite a lot	64.3	2808
	Not very much/nothing at all	6	260
	Total	100	4369
HEinfo	**Used sources of info. on healthy eating (SW2)**	85.3	3724
	Not used any	14.7	644
	Total	100	4368
HEadvice$_1$	**Used healthy eating info. from family or friends (SW2)**	52.7	2302
	Not used any	47.3	2066
	Total	100	4368
HEadvice$_2$	**Used healthy eating info. from other mothers (SW2)**	33.4	1457
	Not used any	66.6	2911
	Total	100	4368
HEadvice$_3$	**Used healthy eating info. from the internet (SW2)**	21.5	939
	Not used any	78.5	3429
	Total	100	4368
HEadvice$_4$	**Used healthy eating info. from books & magazines (SW2)**	56	2448
	Not used any	44	1920
	Total	100	4368
HEadvice$_5$	**Used healthy eating info. from TV & radio (SW2)**	17.4	759
	Not used any	82.6	3609
	Total	100	4368
HealthSup$_1$	**Used healthy eating info. from health professionals (SW2)**	46.3	2021
	Not used any	53.7	2347
	Total	100	4368
HealthSup$_2$	**"If you ask for help or advice on parenting from professionals like doctors or social workers, they start interfering or trying to take over" (SW2)**		
	Agree	8.5	361
	Disagree/neither	91.5	3868
	Total	100	4229
HealthSup$_3$	**"If other people knew you were getting professional advice or support with parenting, they would probably think you were a bad parent" (SW2)**		
	Agree	22.4	971
	Disagree/neither	77.6	3366
	Total	100	4337

1.Data filtered for single-births and cases were mother was biological mother of child.

Table A7 Univariate Analysis – Indicators for parental use of infant feeding advice

VARIABLE NAME	VARIABLE (un-weighted data)	Birth Cohort %	N
Ante	**Attended antenatal classes for this or previous birth (SW2)**	72.7	3668
	Did not attend	27.3	1377
	Total	*100*	*5045*
BFadvice	**Received breastfeeding help/advice at child's birth (SW2)**	74.6	3762
	Did not receive	25.4	1284
	Total	*100*	*5046*
BFmid	**Used help/advice from: midwife (SW2)**	69	3480
	Not used	31	1565
	Total	*100*	*5045*
BFhlthvis	**Used help/advice from: health visitor (SW2)**	24	1212
	Not used	76	3833
	Total	*100*	*5045*
BFprof	**Used help/advice from: other health professional (SW2)**	9.3	469
	Not used	90.7	4576
	Total	*100*	*5045*
BFGOGS	**Used help/advice from: Getting off to a Good Start booklet (SW2)**	6.7	336
	Not used	93.3	4709
	Total	*100*	*5045*
BFNCBT	**Used help/advice from: National Child Birth Trust (SW2)**	1.5	78
	Not used	98.5	4967
	Total	*100*	*5045*
BFvol	**Used help/advice from: Other voluntary group/org. (SW2)**	2	103
	Not used	98	4942
	Total	*100*	*5045*

1.Data filtered for single-births and cases were mother was biological mother of child.

Table A8 Univariate Analysis – Indicators for family meal habits

VARIABLE NAME	VARIABLE (un-weighted data)	Toddler Cohort [SW3] %	N
Together1	**How often child eats with parent & family (SW1-34months)**		
	Every day/ most days	96.1	2643
	Twice a week/less often/never	3.9	106
	Total	100	2749
Together2	**How often child eats with parent & family (SW3-58months)**		
	Every day/ most days	94.7	2125
	Twice a week/less often/never	5.3	120
	Total	100	2245
Time	**How often child has meals at regular times (SW3)**		
	Always	74.7	1676
	Usually/sometimes/never	25.3	569
	Total	100	2245
Same	**How often child eats same food as parent for main meal (SW3)**		
	Always/almost always	70.8	1561
	Sometimes	21.9	483
	Never, almost never	7.3	162
	Total	100	2206
Room	**Where child usually eats main meal (SW3)**		
	Kitchen, dining room, living room-dining room	70.2	1536
	Other room	29.8	651
	Total	100	2187
Takeaway	**Days last week that child ate take-away meal (e.g. fish & chips) (SW3)**		
	Once or less	97.4	2186
	Twice or more	2.6	59
	Total	100	2245
Fresh	**Days last week child ate main meal made with fresh ingredients (SW3)**		
	4 times or less	23.8	533
	5-7 times	76.2	1711
	Total	100	2244
Mrush	**“Meal-times are a rush” (SW3)**		
	Quite often/mostly	14.6	329
	Never/Occasionally	85.4	1917
	Total	100	2246
Mtalk	**“Meal-times give us time to talk to each other” (SW3)**		
	Quite often/mostly	81.2	1824
	Never/Occasionally	18.8	421
	Total	100	2245
Menjoy	**“Meal-times gives are enjoyable for everyone” (SW3)**		
	Quite often/mostly	75.7	1700
	Never/Occasionally	24.3	546
	Total	100	2246
Easy	**How easy or difficult is child to feed? (SW3)**		
	Very/fairly easy	69.2	1553
	Neither easy nor difficult	12.6	282
	Fairly/very difficult	18.3	410
	Total	100	2245

1.Data filtered for single-births and cases were mother was biological mother of child.

Appendix B

Appendix B lays out two journal publications and one briefing which were produced using related MSc research and preliminary PhD research findings.

The first paper (Skafida 2009) is an author-created reproduction of the original version of the published article available at the Public Health Nutrition journal. Reproduction of a hard copy of this article is permitted within the Copyright agreement with Public Health Nutrition.

The second paper (Skafida 2011) provided in this appendix is an author-created version of the final published paper available at www.springerlink.com. Reproduction of a hardcopy of an author-created version is permitted within the Copyright agreement with Springer, and the full paper can be found using the DOI provided.

The third resource is a Research Briefing produces by the Centre for Research on Families and Relationships (CRFR), which draws on MSc findings related to the research in this thesis. The reproduction of this briefing has been approved by CRFR. This briefing can be found online at http://www.crfr.ac.uk/reports/rb36forweb.pdf.

Resource 1: Peer reviewed paper in Public Health Nutrition

Skafida, V. (2009), 'The relative importance of social class and maternal education for breast-feeding initiation', *Public Health Nutrition*, 12, 12, 2285-92

The final publication is available at Public Health Nutrition DOI:10.1017/S1368980009004947

Title: The relative importance of social class and maternal education for breastfeeding initiation

Valeria Skafida

Abstract

Objective: To examine changes in breastfeeding initiation rates among young children in Scotland and to assess whether maternal education or occupation-based social class is a stronger and better predictor of breastfeeding initiation.

Design: Binary logistic regression models were developed from the first sweep of the Growing up in Scotland longitudinal survey, for the two cohorts of children.

Setting: A national representative survey for Scotland

Subjects: A baby cohort of singletons born over a 12-month period between June 2004-May 2005, and a toddler cohort of 2732 singletons born over a 12-month period between June 2002 - May 2003.

Results: Mothers from more privileged social classes and those with more educational qualifications resulted as more likely to breastfeed. However, maternal education was a better and more robust predictor of breastfeeding initiation when compared to social class. There were no significant differences in breastfeeding take-up between the two cohorts and only minor differences between mothers aged 20-29 and those who stated an intention to bottle-feed prior to birth.

Conclusions: The study suggests that the importance of maternal education in influencing breastfeeding has been somewhat overlooked in research based in more developed countries. The results indicate that, compared to occupation-related social class, maternal education is a more informative, accurate and useful lens through which to understand and explain patterns of breastfeeding initiation.

Introduction

Growing policy attention has been paid to the nutrition of infants and the importance of breast milk for child development. Policy documents are based on a wealth of national and international research indicating the positive health outcomes of breastfeeding for mother and child [(1-4)]. At an international level, documents like the *WHO Innocenti Declaration on Breastfeeding* [(5)] and the European Commission's *Protection, promotion and support of breastfeeding in Europe* [(6)] reflect the supranational impetus in promoting breastfeeding. At a UK wide level, this is seen with programmes such as the UK Baby Friendly Initiative. At the Scottish level, the

Scottish Joint Breastfeeding Initiative, and the Infant Feeding Strategy for Scotland [7] reflect a policy agenda which acknowledges the importance of breastfeeding in improving children's chances for a healthy future. More importantly, Scotland recently introduced the Breastfeeding etc. Scotland Act 2005, thus becoming the first nation where breastfeeding has become a legal right [8]. This makes Scotland a unique and interesting platform for research on infant feeding.

Despite this policy impetus, a recent Scottish Government research report based on Millennium Cohort Study data showed that breastfeeding take-up in Scotland was low at 64.7%, and notably lower than in England at 72.2% [9]. A series of national and international initiatives have endorsed breastfeeding, but it appears that mothers, particularly in Scotland, are less inclined towards the breastfeeding option. While maternal education and social class go some way in explaining differences in breastfeeding trends, there seem to be independent policy related or socio-cultural elements at work which make mothers in Scotland less likely to breastfeed than their counterparts in England [9].

Literature Review

It is conventional in social research to analyse and explain a variety of social phenomena through social class. A plethora of research has shown that breastfeeding take-up and duration is influenced by the mother's social class, and breastfeeding trends have often been theorised through the lens of occupation-related class categories. Previous studies unanimously suggest that breastfeeding is more common among the more privileged social classes [10-18]. Undoubtedly, a relationship between breastfeeding and social class exists and this paper does not aim to dispute this. However, such social class schemes are usually operationalised using information about an individual's employment details, which may or may not be the optimal dimension though which to explore and understand differences in breastfeeding practice.

While a vast body of research has looked at the importance of social class, a smaller number of studies have analysed the relationship between education and breastfeeding. Many of these have focused on developing countries and analogous studies in the developed world are less common. Nevertheless, some evidence indicates that education is a strong predictor of breastfeeding [19-21] which is undoubtedly also correlated with employment outcomes. The quintennial Infant Feeding Survey report for 2005 showed that 87% of Scottish mothers who completed their education after the age of 18, compared to 68% who completed it at 17 or 18, and 48% at 16 years or less actually breastfed at all, with figures having risen for all groups by 2-4% since 2000 [22]. Recently, a research report by the Scottish Government based on MCS data found that, in Scotland, mothers with higher educational qualifications had increased chances of breastfeeding their child compared to those with no qualifications [9]. Most strikingly, this report indicated that while social class was a significant predictor of breastfeeding on its own, it fell out of significance when analysed in a model which also included maternal education.

The aim of this paper is to examine the relative importance of social class and maternal education in predicting breastfeeding incidence. This is not an attempt to disprove that a relationship between social class and breastfeeding exists. More specifically, the paper seeks to explore whether maternal educational qualifications, as a lens for capturing social stratification, are a more insightful, more useful and more robust predictor of breastfeeding initiation than an occupation-based social class scheme may be. This analysis inevitably touches upon the sociological debate regarding the conceptualisation and operationalisation of social class in social research and the associated questions regarding the measurement of social stratification and human capital [(23-25)]. However, while the analysis may contribute to this debate, engaging fully in this discussion is not part of the objectives for the paper.

Methods

The growing interest in policies for young children and infants has been matched by a growing wealth of social research on babies and young children. However, except for a range of administrative data sources which collect basic information on breastfeeding take-up, few surveys go into the required detail in order to allow for an in-depth analysis of the social processes which influence infant feeding. The Infant Feeding Survey for the UK is regularly used for reports on some basic trends of breastfeeding. A richer survey is the UK Millennium Cohort Study (MCS) of young children which collects data on a series of important demographic variables regarding the mother and enquires about breastfeeding. The Growing Up in Scotland (GUS) longitudinal survey is similar to the MCS in many respects. GUS was launched later than the MCS (2004 and 2001 respectively), thus the GUS sample is younger and the relevant phenomena of interests are more recent. More importantly, GUS is specifically tailored to survey families and children living in Scotland, in the evolving Scottish social and policy context. Thus, GUS was the preferred data source for the analysis.

The GUS survey design is described fully elsewhere [(26)]. In brief, 5217 eligible babies and 2858 toddlers were interviewed for the survey, originally sampled from the Child Benefit Register by the Department of Work and Pensions. Babies born between June 2004 and May 2005 were sampled for the baby cohort, and were approximately 10 months old at the interview. Toddlers born between June 2002 and May 2003 make up the toddler cohort, and were approximately 34 months at the time of interview.

The sampling frame was stratified by aggregated Data Zones, which are units created by the Scottish Executive (now the Scottish Government) for reporting 2001 Census small area statistics. These zones were then sorted by Local Authority and by the Scottish Index of Multiple Deprivation score. From this hierarchically sorted list, 130 zones were selected at random [(27)]. Separate weights for each sample were applied to account for the stratified sampling procedure, to correct for the different probability of selection for some of the children, and to correct for non-response bias.

Interviews were carried out in the homes of the participants using Computer Assisted Personal Interviewing (CAPI). They mostly contained closed questions and included a self-completion section. The survey aimed to interview the main carer of the sample child and particularly for the first sweep, which contained questions on breastfeeding, this was to be predominantly (99% of cases) the mother. Cases where the biological mother was not interviewed, and were the child was born in a multiple birth are excluded from the present analysis.

Among a range of topics covered, mothers were asked whether or not they had ever breastfed the sample child (even if only one time). Additional demographic variables on employment and education were also collected. Mothers were categorised into social class categories according to the National Statistics Socio-Economic Classification (NS-SEC) scheme. This is calculated on the basis of information regarding individual's working conditions, job security, timing of payments, opportunities for promotion and incremental pay [28]. Class level for government funded surveys was previously assigned to the household depending on the status of the highest earner, usually the man, but the NS-SEC scheme classifies the mother and father separately, so a measure for the mother alone is used for the analysis. The NS-SEC can be arranged in 8, 5 and 3 bands. The 5-band classification is used in the analysis, as a more detailed classification scheme in combination with other categorical variables severely hampered the analysis. The bands range as follows: 1) managerial and professional, 2) intermediate, 3) small employers and own account workers, 4) lower supervisory and technical and 5) semi-routine and routine occupations. It should be noted that the long-term unemployed and mothers who never worked are categorised together with those in the routine occupations.

A banded variable indicating the mother's highest educational qualifications was used for the analysis to represent the mother's educational level. Also, a question on whether mothers had received any help or advice about breastfeeding at the time of birth was relevant in the analysis. Mothers were also asked to recall their feeding intentions prior to birth, and whether they intended to breast- or bottle-feed, or if they had no preferences at all. It should be noted, though, that particularly the variable on feeding intentions is subject to recall bias, or re-interpretation 10 or 34 months into the child's life.

Most of the studies reviewed found that birth order (parity) and the age of the mother at the time of birth were also related to breastfeeding [22, 29-31] so these two variables were controlled for in the analysis. The mother's age was entered as a continuous variable in the logistic regression analysis, but it is presented in banded form in the descriptive tables 1 and 2. The reviewed literature indicated that other variables, such as the sex of the baby, marital status and employment history can influence breastfeeding patterns. However, these additional variables, while significant on their own, fell out of significance while testing a full model. All singleton births were analysed where the biological mother of the child was interviewed (toddler cohort N= 2732, baby cohort N= 5012).

Binary Logistic regression models were specified for the two cohorts and all analyses were performed using SPSS version 14.0 (SPSS Inc., Wacker Drive, IL, USA). The regression model was arranged with breastfeeding incidence as the dependent variable, and controlled in the first stage for the effects of social class, parity, age of the mother at birth, receipt of breastfeeding advice and anticipated feeding plans. At the second step the model was adjusted for the effects of maternal education. The change in reported odds ratios and significance levels for the social class variable after controlling for maternal education indicate the relative importance of these variables in determining breastfeeding.

Results and Discussion

Table 1 provides descriptive statistics of the two un-weighted samples featuring the proportions of mothers who match the selected social demographic characteristics explored in the analysis. Among other things it indicates that mothers in the managerial social class category make up 36% of the total sample, while the real proportion in the population is considerably lower. The weights constructed for the data and applied for the analysis correct for these response bias effects.

Comparing the two cohorts

Table 2 is based on weighted samples and indicates the proportions of mothers who initiated breastfeeding by selected demographic characteristics, and highlights where there were statistically significant differences in breastfeeding proportions between the two cohorts. Overall, the reported breastfeeding initiation rate was marginally higher, by 1%, among mothers of the baby cohort, but the difference was non-significant (p=0.388). The patterns among both cohorts were largely similar.

Breastfeeding take-up was more common among older mothers, and the take-up rate was a statistically significant 4% higher among mothers of the baby cohort compared to those of the toddler cohort for those aged 20-29. As previously shown by other research, mothers with degrees or equivalent educational qualifications had the highest breastfeeding rates among both cohorts, as did those in managerial or professional occupations. Unsurprisingly, mothers who stated having received breastfeeding advice had higher breastfeeding initiation rates. The breastfeeding rate among mothers who planned to bottle-feed was slightly lower for the mothers of the baby cohort, which was a substantively unimportant difference, albeit statistically significant.

Comparing Social Class and Education

Table 3 shows how the odds ratios and significance levels for the social class variable change after adjusting the model for maternal educational qualifications. What becomes evident is that, for both cohorts, the NS-SEC classification scheme is an adequate predictor of differences in the likelihood of breastfeeding initiation when controlling for other relevant variables. However, when also controlling for maternal education, the significance levels for the social class categories are affected so as to render most of the categories of the variable itself non-significant for both cohorts, but especially for the baby cohort.

Table 1 Characteristics of unweighted baby and toddler samples

	Baby Cohort†		Toddler Cohort†	
	N	%	N	%
If child was ever breastfed				
Yes	3119	61.7	1673	60.9
No	1935	38.3	1076	39.1
Total	5054	100	2749	100.0
Parity				
First birth	2473	48.9	1284	46.7
Later birth	2581	51.1	1465	53.3
Total	5054	100	2749	100.0
Age of mother at birth of sample child				
Under 20	348	6.9	179	6.5
20 to 29	2053	40.6	1113	40.5
30 to 40	2481	49.1	1380	50.2
40 or older	171	3.4	76	2.8
Valid total	5053	100	2748	100.0
Missing	1	0.0	1	0.0
Total	5054	100	2749	100.0
Mother's social class				
Managerial and professional	1817	36.0	1006	36.6
Intermediate	983	19.4	444	16.2
Small employers and own account workers	196	3.9	131	4.8
Lower supervisory and technical	305	6.0	170	6.2
Semi-routine and routine	1504	29.8	855	31.1
Valid total	4805	95.1	2606	94.8
Missing	249	4.9	143	5.2
Total	5054	100.0	2749	100.0
Mother's Education				
Degree or Equivalent	1404	27.8	761	27.7
Vocational qualification below degree	1861	37.0	1019	37.1
Higher grade or equivalent	410	8.1	204	7.4
Standard grade or equivalent	904	17.9	485	17.6
No qualifications	450	8.9	268	9.7
Valid total	5039	99.7	2737	99.6
Missing	12	0.1	10	0.4
- Other	3	0.2	2	0.1
Total	5054	100	2749	100.0
Feeding method planned prior to birth				
Breastfeeding	3289	65.1	1729	62.9
Bottle-feeding	1451	28.7	828	30.1
No strong preference	305	6.0	190	6.9
Valid total	5045		2747	99.9
Missing	9	0.2	2	0.1
- Don't know	7	0.1	2	0.1
- Refusal	2	0.0	0	0.0
Total	5054	100.0	2749	100.0
If mother received breastfeeding help or advice				
Yes	3765	74.5	2033	74.0
No	1284	25.4	713	25.9
Valid total	5049	99.9	2746	99.9
Missing	5	0.0	3	0.1
- Don't know	3	0.1	3	0.1
- Refusal	2	0.1	0	0.0
Total	5054	100	2749	100.0

† Both samples are filtered for single births and biological mothers only

Table 2 Breastfeeding incidence by socio-demographic characteristics: differences between cohorts (weighted samples)

	Baby Cohort†		Toddler Cohort†	
Mothers who breastfed their child:	N	%	N	%
Sex of sample child				
Male	1563	60.5	815	58.0
Female	1463	60.2	807	60.8
Total (Baby N: 5012, Toddler N: 2732)	3026	60.4	1622	59.4
Parity				
First birth	1574	62.8	818	61.7
Later birth	1452	58.0	804	57.1
Total (Baby N: 5012, Toddler N: 2732)	3026	60.4	1622	59.4
Age of mother at birth of sample child [2]				
Under 20	131	32.7	73	34.8
20 to 29**	1158	54.3	588	50.4
30 to 40	1622	69.9	915	70.9
40 or older	114	73.5	46	70.8
Total (Baby N: 5012, Toddler N: 2731)	3025	60.4	1622	59.4
Mother’s social class				
Managerial and professional	1360	78.9	755	78.8
Intermediate	586	60.4	268	60.5
Small employers and own account workers	135	72.6	84	67.7
Lower supervisory and technical	148	48.2	82	47.7
Semi-routine and routine	710	45.8	375	42.6
Total (Baby N: 4737, Toddler N: 2578)	2939	62.0	1564	60.7
Mother’s Education				
Degree or Equivalent	1150	86.8	603	84.0
Vocational qualification below degree	1084	58.5	599	58.6
Higher grade or equivalent	265	64.5	129	63.5
Standard grade or equivalent	381	40.7	194	39.1
No qualifications	140	29.6	94	33.5
Total (Baby N: 4997, Toddler N: 2721)	3020	60.4	1619	59.5
Feeding method planned prior to birth				
Breastfeeding	2814	87.7	1487	88.1
Bottle-feeding**	58	3.9	51	6.0
No strong preference	151	49.5	83	43.7
Total (Baby N: 5001, Toddler N: 2730)	3023	60.4	1621	59.4
If mother received breastfeeding help or advice				
Yes	2511	67.6	1324	65.4
No	514	39.9	298	42.2
Total (Baby N: 5005, Toddler N: 2729)	3025	60.4	1622	59.4

† Both samples are filtered for single births and biological mothers only

** Significant at p≤0.05

Table 3 Odds ratios for breastfeeding by social class before and after adjusting for maternal education

	Model adjusted for social class, receipt of breastfeeding advice, breastfeeding plans, parity and age	Model also adjusted for maternal educational qualifications
	OR (95% CI)	OR (95% CI)
BABY COHORT† (N= 5012)		
Mother's social class		
Managerial and professional	***	**
Intermediate	0.60 (0.46-0.79)***	0.89 (0.67-1.18)
Small employers and own account workers	1.20 (0.67-2.14)	1.81 (0.99-3.30)
Lower supervisory and technical	0.47 (0.32-0.69)***	0.73 (0.48-1.09)
Semi-routine and routine	0.44 (0.35-0.57)**	0.78 (0.59-1.03)
Mothers Education		
Degree or equivalent		***
Vocational qualifications below degree		0.37 (0.28-0.50)***
Higher grade or equivalent		0.44 (0.30-0.67)***
Standard grade or equivalent		0.27 (0.19-0.38)***
No qualifications		0.21 (0.13-0.33)***
TODDLER COHORT† (N= 2732)		
Mother's social class		
Managerial and professional	***	
Intermediate	0.53 (0.36-0.76)***	0.67 (0.45-1.00)
Small employers and own account workers	0.67 (0.36-1.22)	0.81 (0.43-1.51)
Lower supervisory and technical	0.37 (0.22-0.62)***	0.49 (0.28-0.83)**
Semi-routine and routine	0.43 (0.31-0.60)***	0.63 (0.43-0.92)**
Mothers Education		
Degree or equivalent		***
Vocational qualifications below degree		0.61 (0.41-0.89)**
Higher grade or equivalent		0.74 (0.42-1.31)
Standard grade or equivalent		0.38 (0.24-0.60)***
No qualifications		0.41 (0.23-0.71)**

† Both samples are filtered for single births and biological mothers only

*** Significant at p≤0.001

** Significant at p≤0.05

The first step of the model indicates that social class is a strong predictor of breastfeeding initiation for the mothers of both cohorts. For both cohorts, the small employer and own account worker category features as not being significantly different in terms of breastfeeding odds from the reference category, the managerial and professional group. Perhaps this indicates that the two categories of mothers are fairly similar in terms of other characteristics which in turn influence breastfeeding outcomes.

The small employers and own account workers as a category is largely made up of self employed mothers, with 98% and 97% for the baby and toddler cohort respectively reporting to be self-employed. The social make-up of the self-employed is a growing field of interest. Some research has suggested that, given the heterogeneity of this group, it would be more useful to subdivide the self-employed according to skills and educational qualifications for a more insightful analysis, particularly as many of today's self-employed are at the higher end of the income and education scale [32, 33].

A brief analysis of the sample showed a significant difference between the income distribution of employees and of self-employed mothers, for the baby and toddler cohort ($p \leq 0.001$, $p \leq 0.05$), and a marginally significant difference in the educational qualifications between the two groups among the mothers of toddlers only ($p \leq 0.05$). Among self-employed mothers in the baby cohort, 32% were in the top income quartile compared to 22% of mothers who were employees, with the respective figures being 35% and 25% for the toddler cohort. As for education, 40% of self-employed mothers compared to 34% of those working as employees had a degree or equivalent for the baby cohort with the respective figure being 36% and 33% for the toddler cohort.

After controlling for the effects of maternal educational qualifications in the model, there was a notable decrease in the predictive power of social class, for both cohorts. Most class categories dropped out of significance for both cohorts, with changes in significance being more marked for the babies, potentially also due to the larger sample size of the baby cohort. More importantly, even with social class in the model, maternal education resulted as being a highly important predictor in the model, for both cohorts. In response to the research question, the above evidence indicates that maternal education is a relatively better and stronger predictor of breastfeeding take-up, and a more useful conceptual tool for understanding breastfeeding trends than an occupationally-based measure of social class is. While education and occupational outcomes are correlated, education has a more direct influence on breastfeeding outcomes than employment-related social class does. It may be that having spent an extended time in formal education renders mothers more able to educate themselves on further topics, such as infant nutrition. Perhaps more educated mothers are more likely to be aware of, and search for relevant information regarding optimal infant nutrition, and are more likely to attempt to breastfeed their own infant.

The logistic regression results indicate that there is to some degree a linear positive trend between breastfeeding take-up and education, where mothers with no qualifications result as having 80% lower chance for the baby cohort, and 60% for the toddler cohort, of initiating breastfeeding compared to those with degrees or equivalent, who were the most likely to initiate breastfeeding. The mothers with vocational qualifications, however, resulted as being less likely to breastfeed than mothers with higher grades or equivalent, despite having achieved more educational qualifications. A brief analysis of the data indicated that 28% of mothers with higher grades or equivalent were in managerial occupations compared to 26% of those with vocational qualifications for the baby cohort (non-significant $p=0.065$), with the respective figures being 40% and 25% for the toddler cohort (significant $p \leq 0.001$). So, while social class and educational qualifications generally go hand in hand, mothers who opt for vocational qualifications seem to be associated with a less privileged outcome in terms of occupation and social class than those with higher grades or equivalent, despite having spent more time in education. Perhaps mothers who choose vocational qualifications tend to have other attributes which are correlated with a less favourable social context for breastfeeding when compared to mothers with a higher grade or equivalent, but this would require further research.

Conclusion

In conclusion, previous studies have shown that social class is a strong predictor of breastfeeding take-up, and mothers in more privileged classes are more likely to breastfeed their infants than their less privileged counterparts. However, while a large body of research has concentrated on the importance of social class, the importance of maternal education has been somewhat overlooked. The present findings suggest that higher educational qualifications are associated with a higher likelihood of breastfeeding initiation. More importantly, though, while social class is a useful predictor of breastfeeding patterns, maternal education is a relatively *more* useful and robust dimension through which to explain and understand differences in breastfeeding take-up. More educated mothers might be more up to date with the recommendations made by health authorities and spending more time in formal education might render mothers more willing, more likely and more able to pursue practices associated with optimal child development, such as breastfeeding.

It is hoped the findings reported in this paper may inform future research on infant feeding so that the importance of maternal education is not overlooked in future work. The implications for social policy based on the findings are very general and the evidence merely suggests that an increased investment in formal education could potentially be a way to address, among other issues, low take-up rates for breastfeeding. However in-direct this method may be in addressing this issue, investment in higher education would most likely also benefit other aspects of the welfare of the mother and child.

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Title: Juggling Work and Motherhood: The Impact of Employment and Maternity Leave on Breastfeeding Duration: A Survival Analysis on Growing Up in Scotland Data

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Abstract
In 2005, Scotland became the first nation to make breastfeeding in public a legal right, but current breastfeeding targets and maternity leave allowance do not acknowledge the conflicting demands women face when juggling employment and motherhood. This paper explores how employment and maternity leave relate to breastfeeding duration among mothers in Scotland. The Growing Up in Scotland national longitudinal cohort study of 5,217 babies born in 2004–2005 was used. Multivariate proportional hazards regression models were specified using one cross-sectional wave of data to predict breastfeeding duration. Mothers working as employees, full-time (Hazard Ratio 1.6) or part-time (HR1.3), had a higher risk of earlier breastfeeding cessation than non-working mothers. However, self-employed mothers did not differ significantly from non-working mothers in their breastfeeding patterns. Mothers who took longer maternity leave breastfed for longer. The relationships between employment, maternity leave and breastfeeding duration were significant when controlling for known predictors of breastfeeding. Younger mothers, those with less formal education, single mothers, those of white ethnic background, and first-time mothers were more likely to stop breastfeeding sooner, as has been noted in previous research. Employment and early return to work are both factors associated with a shorter duration of breastfeeding. More flexible working conditions and more generous employment leave could help to prolong breastfeeding among working mothers. Current health and employment policy in Scotland and the UK could be better coordinated so that working mothers have the adequate support to meet the conflicting demands of employment and motherhood.

Introduction
A wealth of research has focused on the positive health outcomes of breastfeeding for mother and child [1–4]. A growing interest in infant nutrition on the public health

policy agenda throughout Europe has followed [5], and this has been particularly pronounced in Scotland, which in 2005 became the first nation to make breastfeeding a legally enforceable right [6]. More recently, the Scottish Government's Healthy Eating, Active Living action plan [7] outlined a goal to have 32.7% of all infants being exclusively breastfed at 6–8 weeks by 2010–2011, while the World Health Organisation (WHO) recommends that infants are breastfed exclusively for at least 6 months. Despite the increased promotion of breastfeeding in Scotland and the UK more generally, policy recommendations do not appropriately consider the conflicting demands of employment and breastfeeding faced by working mothers. UK wide Statutory Maternity Pay provides for 6 weeks paid leave at 90% of average weekly earnings, and a flat rate sum of £124.88/week for the following 33 weeks (rate from April 2010) [8]. As some maternity leave is usually taken before the birth, current leave provision is unlikely to support mothers to breastfeed for the 6–8 weeks target set by the Scottish Government, nor the more ambitious 6 months proposed by WHO. A lack of coordination between the WHO breastfeeding recommendations and Scottish Government breastfeeding targets on the one hand and current UK maternity leave policy on the other, seems apparent.

The idea that continued breastfeeding and employment pose conflicting demands on mothers has been well researched. The evidence suggests that participation in employment is correlated with earlier breastfeeding cessation [9], and working full-time was associated with shorter breastfeeding durations than working part-time [10, 11]. Research looking at maternity leave and breastfeeding duration, indicated that postpartum maternity leave is positively associated with breastfeeding duration, especially for mothers in less flexible employment, and longer leaves were linked to prolonged breastfeeding [12, 13]. But most of the reviewed literature is either qualitative in nature and/or based on non-UK populations, excluding research by Hawkins et al. [11], which did not look at maternity leave and breastfeeding duration. As such, existing research cannot offer an appropriate insight into the relationship between employment and maternity leave, and breastfeeding patterns among mothers in Scotland in recent years, who have to juggle employment and child nutrition in Scotland's unique policy and socio-legal climate.

Aims

While a considerable amount of research has been undertaken on the relationship between breastfeeding duration and maternal labour market participation, most studies have focused on non-UK [10] and primarily US samples [9, 12, 13] which cannot account for the breastfeeding decisions and patterns of mothers subject to the cultural and policy context of the UK, and more particularly Scotland. This paper explores the relationships between maternal employment and maternity leave with regard to breastfeeding duration among mothers in Scotland, while controlling for known predictors of breastfeeding. Two proposed hypotheses frame the research: (a) that maternal participation in employment has a negative effect on breastfeeding duration, (b) that mothers who take longer maternity leave are able to breastfeed for longer, and (c) that maternity leave mediates the negative effect that maternal employment has on breastfeeding duration.

Methods

Participants

As the scope of the research was to understand breastfeeding trends in Scotland, the Growing Up in Scotland (GUS) survey was deemed to be the most appropriate source of data for the research. The Growing Up in Scotland survey is a national longitudinal survey of children aged nought to five in Scotland which collects information on a range of topics related to children's development from birth through to early childhood. As such, it is more suitable for multivariate analysis then other administrative data on breastfeeding, such as the Infant Feeding Survey. GUS follows two separate cohorts through annual survey sweeps. The baby cohort consists of 5,217 babies who were born between June 2004 and May 2005, who were 10 months old at the time of the first sweep [14]. The toddler cohort consists of 2,858 toddlers aged 34 months at the first survey sweep, but as no breastfeeding duration data was collected for this cohort the following analysis focuses exclusively on the baby cohort.

The sample was based on the Child Benefit Register held at the Department of Welfare and Pensions. The sampling frame was stratified and aggregated into Data Zones [units created by the Scottish Executive, now the Scottish Government, for reporting 2001 Census small area statistics] which were in turn sorted by Local Authority and by the Scottish Index of Multiple Deprivation score. From this hierarchically sorted list, 130 zones were randomly selected [14]. Given the nature of the sampling procedure, the appropriate sample weights provided were used for the following analysis to adjust for non-random non-response bias, and for unequal probability of selection for some children. The official user guide for the first sweep of data describes the survey design in further detail [15].

Outcome Measure

The mothers of the baby cohort The mothers of the baby cohort were asked whether they had ever breastfed the sample child. Those who had breastfed were also asked to report how old the child was when it was last breastfed. The cohort was 10 months old at the time of interview, and 481 (16%) babies were still being breastfed. Data on those still breastfeeding at sweep one was obtained in subsequent sweeps. However, because full details on maternity leave were only collected at sweep one only the duration spanning from 1 day to 10 months inclusive was analysed in this research and mothers who breastfed for longer were included in the analysis but censored at 10 months. Cases where the biological mother was not interviewed, and where the child was born in a multiple birth, were excluded from the present analysis. Of the remaining 5,015 mothers in the sample, 3,034 had breastfed at least once, and the analysis of breastfeeding duration focuses on this sub-sample. While the survey design is longitudinal, breastfeeding duration data was retrospective based on maternal recall of breastfeeding duration at the first interview 10 months post partum.

Table 1 Comparing exclusive and complementary breastfeeding duration rates

Data from the Growing Up in Scotland survey and the Infant Feeding Survey for 2005

(duration in % among all mothers in sample)

	GUS – comp. [1]	IFS 2005 [2] – comp.	IFS 2005 [2] – excl.
Breastfed initially	60	70	61
At 1 week	52	57	42
4 weeks	45	n/a	25
6 weeks	42	44	19
8 weeks (2 months)	38	n/a	17
17 weeks (4 months)	30	31	6
26 weeks (6 months)	23	24	<0.5

1. Filtered for single births and biological mothers, weighted data
2. Infant Feeding Survey: Scotland sub-sample

Current Scottish Government and WHO targets are based on exclusive breastfeeding [16], while the GUS questionnaire, designed to monitor previous Scottish Government targets, measures complementary breastfeeding [17]. Figures for complementary breastfeeding will include mothers who breastfeed exclusively as well as those who feed their child with a mixture of breast and formula milk. Table 1 illustrates the difference between complementary and exclusive breastfeeding through 2005 Infant Feeding Survey and GUS data. By 6 months there were virtually no mothers still breastfeeding exclusively while one in four was still using breastfeeding in combination with other forms of feeding. Looking at complementary, rather than exclusive, breastfeeding allows for an analysis of feeding duration to look at a much larger number of mothers for a much longer period of time.

Predictors

The variables explored in the analysis are presented in Table 2 which shows the rates of overall breastfeeding take-up (grey column), and for breastfeeding duration under 6 weeks and for 6 weeks or more for each category of each independent variable.

Employment and Maternity Leave

Assessing the relationship between employment, maternity leave and breastfeeding duration was the central interest of the paper. One variable captured whether mothers were working full-time as employees (30 h/week or more), fulltime as self-employed, part-time as employees (under 30 h/ week), part-time as self-employed, or whether they did not work at all at the time of birth. The variable measuring maternity leave accounted for all paid and unpaid leave taken by the mother. This is banded in monthly intervals, with a final interval of those taking six to 10 months leave, and a category which accounts for those still on leave at the first survey sweep. As the analysis of employment leave focuses only on mothers who were in paid employment at the time of birth, the sample for this part of the analysis consisted of

2,079 mothers. Information on maternity leave was based on retrospective recall of mothers at the first survey sweep, 10 months postpartum. The methodological implications for validity and reliability of data collected are worth considering.

Confounders

A number of confounders were considered in the analysis based on previous research on breastfeeding duration [18–20]. Confounders of primary interest were variables which were expected to capture the social stratification of resources and capabilities which influence maternal health behaviours, including infant feeding decisions and aspirations. Relevant variables explored included the mother's highest educational qualifications held when the child was born, maternal social class, based on the UK's National Statistic Socio-Economic Classification scheme [21], and total household income at sweep one in quartiles. Ultimately, only maternal education and maternal social class were controlled for in the multivariate regression models. Exploratory analysis indicated that household income, and to a lesser degree maternal social class, were not significant predictors of breastfeeding when also controlling for maternal education. The superiority of maternal education in predicting breastfeeding decisions, compared to maternal social class and household income, was consistent with findings from previous research [22, 23].

Statistical Analysis
Stata version 10.1 (StataCorp, College Station, TX, USA) was used for all analyses. Given the nature of the data being duration data, survival analysis through proportional hazards regression was the most appropriate method for testing explanatory models for breastfeeding duration. The first stage of analysis involved comparing survival rates for individual independent variables through Kaplan–Meier plots [24]. Tests of equality of survival were based on the log rank test, and significant variables were explored through subsequent multivariate proportional hazards regression models. These provide hazard ratios for the cessation of breastfeeding for each category of each independent variable adjusting for the remaining variables in the model [25].

Table 2 Rates of complementary breastfeeding by independent variables considered in the analysis

Mothers who breastfed their child (adjusted %)	**Breastfed at least once**	**Breastfed less than 6 weeks**	**Breastfed 6 weeks or more**	**P value**
All mothers (N: 5051)	58.8	17.8	41.0	
Sample child's birth order (N: 5051)				$p \leq 0.001$
First birth (N: 2470)	61.2	20.9	40.3	
Subsequent birth (N: 2581)	56.4	14.8	41.6	
Mother's age at birth [1] (N:5050)				$p \leq 0.001$
Under 20 (N:347)	32.7	18.7	14.0	
20 to 29(N:2052)	52.9	19.0	33.9	
30 to 40 (N:2480)	68.0	17.1	50.2	
40 or older (N:171)	71.4	10.2	60.2	

Family composition (N: 5051)				p ≤0.001
Couple household (N:4093)	65.0	18.1	46.9	
Single parent household (N:958)	35.1	16.8	18.2	
Mother's ethnic background (N: 5048)				p ≤0.001
White (N: 4861)	58.1	17.8	40.4	
Other (N: 187)	75.1	20.5	54.7	
Mother's education (N:5051)				p ≤0.001
Degree or Equivalent (1409)	86.8	14.8	69.0	
Vocational qualification below degree (1871)	58.5	20.9	36.6	
Higher grade or equivalent (372)	61.7	19.9	40.3	
Standard grade or equivalent (905)	40.8	17.8	21.8	
No qualifications(448)	29.6	12.8	15.8	
Missing data (52)	77.0	15.8	51.5	
Mother's social class (N:5044)				p ≤0.001
Managerial and professional (1816)	78.9	17.2	59.2	
Intermediate (983)	60.4	19.2	40.1	
Small employers and own account workers (196)	72.6	15.1	57.1	
Lower supervisory and technical (305)	48.3	17.2	29.3	
Semi-routine and routine (1744)	45.8	19.1	25.7	
Never worked	30.4	11.3	18.3	
Annual household income – Quartiles (N:5051)				p ≤0.001
Up to £14,999 (1315)	39.4	16.8	22.6	
£15,000 - £25,999 (1131)	57.3	20.0	37.2	
£30,000 – £43,999 (1265)	68.5	17.8	50.7	
£44,000 or more (823)	79.7	15.8	63.8	
Missing data (517)	60.6	18.7	41.9	
Employment status at time of birth (N: 5049)				p ≤0.001
Full-time, employee (748)	69.2	20.3	49.0	
Full-time, self-employed (48)	83.7	18.6	65.1	
Part-time, employee (1841)	62.2	19.7	42.6	
Part-time, self-employed (142)	77.7	11.0	66.7	
Not in work (2270)	51.2	16.0	35.2	
Leave from work - paid & unpaid - sw1 (N: 2473)				p ≤0.001
No leave - up to 1 month (38)	63.2	10	50.7	
Over 1 month – up to 2 months (64)	66.3	22.9	43.4	
Over 2 months – up to 3 months (99)	61.3	21.4	39.9	
Over 3 months – up to 4 months(133)	52.6	20	31.3	
Over 4 months – up to 5 months (268)	64.3	22.5	40.2	
Over 5 months – up to 6 months (1099)	65.6	20.5	43.9	
Over 6 months (665)	75.4	16	57.7	
Still on leave at sweep 1 (107)	76.0	17.2	56.1	

1.Age is presented in banded form but the continuous variable for age was used in regression analyses
2.Data filtered for single-births and cases were mother was biological mother of child
3.Percentages are based on weighted data; N values are based on un-weighted data

Preliminary models indicated that while social class, income and education were individually significant predictors of breastfeeding duration, when combined in a multivariate model, social class and income fell out of significance, but maternal education remained a significant and robust predictor. Thus, final models presented in the paper only used maternal education and maternal social class as key stratifying variables. Visual examination of survival plots and tests of proportionality of cessation using saved scaled schoenfeld residuals were carried out to test that the difference in breastfeeding cessation rates between groups were proportional over time [24]. As the above procedure cannot be carried out using survey-weights, models were initially specified on un-adjusted data and then re-run on adjusted data to account for the stratified sample design of the survey. Interaction terms tested were not significant based on the Likelihood-ratio test (P[0.05) and were not included in the final models [25]. Multicollinearity tests were run using collinearity tests available for linear regression analysis, and none of the predictors reached a tolerance value of less than 0.200, indicating that multicollinearity did not jeopardise the results [26].

The regression models were based on a complete-case analysis and in order to minimise the loss from non-response, a category capturing ‘missing data’ was included in the regression models for educational qualifications (N:693). Two final models are presented in Table 3. Model 1 tests the relationship between maternal employment status and breastfeeding duration while controlling for maternal education, maternal social class, age at birth, child’s birth order, family composition and the mother’s ethnicity. Model 2 focuses only on working mothers (N:1652) and assesses the relationship between maternity leave and breastfeeding duration while controlling for maternal employment status as well as the aforementioned confounders.

Results

Employment and Maternity Leave

The 1st model looks at the relationship between maternal employment status and breastfeeding duration. Initially, descriptive data in Table 2 indicated that self-employed mothers working part-time were most likely to breastfeed for 6 weeks or more (66.7%), while non-working mothers were the least likely to both initiate breastfeeding (51.2%) and to breastfeed for 6 weeks or longer (35.2%). Nonworking mothers would be expected to have the highest take-up and longest duration of breastfeeding, based on a hypothesis which assumes employment and prolonged breastfeeding pose conflicting demands on maternal time. The survival analysis revealed that it was not the lack of employment which was associated with a lower predisposition towards breastfeeding, but other common characteristics of non-working mothers, such as being younger and having less educational qualifications, which was in turn accounting for the negative relationship between unemployment and shorter breastfeeding spells. In fact, proportional hazards regression model 1 shows that, controlling for other confounders such as age, education and social class, mothers not in work were at a lower risk of earlier breastfeeding cessation (Hazard Ratio 0.6) when compared to mothers working as full-time employees. In fact, part-time self-employed mothers and part-time employees were also less likely to stop breastfeeding sooner (HR 0.6 and 0.8) compared to full-time employees.

Model 2 tests the relationship between maternity leave and breastfeeding, while controlling for the relationships between maternal employment status and breastfeeding duration. Compared to mothers who were still on leave when the child was aged 10 months, mothers who took over 1 month and up to 2 months of leave had a higher risk of earlier breastfeeding cessation (HR 1.6). In contrast, there were no statistically significant differences between mothers still on leave at the first interview, and those who took over five and up to 6 months of leave, or those who took over 6 months and up to 10 months of leave. Controlling for maternity leave in the model seemed to mediate some of the association between maternal employment status and breastfeeding duration. However, even when controlling for maternity leave taken and other confounders in the model, mothers working as part-time employees were still statistically significantly less likely to give up breastfeeding sooner than those working as full-time employees (HR 0.9).

The evidence suggests that maternity leave is positively associated with breastfeeding duration, with longer leave allowing for longer breastfeeding spells, controlling for the remaining confounders in the model. This positive effect appears to be less important for mother taking more than 5 months of maternity leave. Also, while maternity leave mediates some of the negative relationship observed between maternal employment and breastfeeding duration, mother working part time are still more likely to breastfeed for longer.

Other Confounders

Some further results are worth noticing from the regression models. Older mothers, those living in two-parent households, and those who had already given birth to other children previously, were significantly more likely to breastfeed for longer. Mothers from ethnic minority groups were also more likely to continue to breastfeed for longer. However, when controlling for maternity leave in the second regression model, ethnicity was no longer significant ($P = 0.38$). Model 1 also indicates that, when controlling for the above confounders, the mother's educational profile remains a significant predictor of breastfeeding duration. More specifically, compared to mothers with degree qualifications or equivalent, mothers with no qualifications were far more likely to give up breastfeeding sooner (HR 2.2). A discrepancy can also be noted when comparing mothers with higher grade or equivalent qualifications, who, compared to degree-holding mothers, have a higher risk of earlier breastfeeding cessation (HR 1.6). It is interesting to note while maternal social class was a significant predictor of breastfeeding duration in the bivariate analysis (Table 2), this variable was no longer significant when controlling for maternal education and other confounders in the model. Preliminary models also explored the influence of household income in predicting breastfeeding patterns but this variable fell out of significance when also controlling for maternal educational qualifications and maternal social class.

Table 3 Proportional hazards regression –predicting breastfeeding duration up to 10 months

Variable reference categories in italics	**MODEL 1** (excludes mothers who never breastfed) (N:3027)		**MODEL 2** (excludes mothers not working at time of birth) (N:1652)	
	Hazard Ratios	**[95% CI]**	**Hazard Ratios**	**[95% CI]**
Mothers Education				
Degree or equivalent				
Vocational qual/s below degree	1.596***	[1.435,1.775]	1.590***	[1.386,1.825]
Higher grade or equivalent	1.584***	[1.385,1.811]	1.567***	[1.300,1.889]
Standard grade or equivalent	2.142***	[1.832,2.504]	2.255***	[1.811,2.809]
No qualifications	2.224***	[1.797,2.753]	2.131***	[1.396,3.254]
Missing Data	0.814	[0.528,1.257]	1.074	[0.608,1.895]
Mother's social class				
Managerial and professional				
Intermediate	0.948	[0.839,1.073]	0.878	[0.748,1.031]
Small employers & own account workers	0.967	[0.745,1.257]	0.740	[0.497,1.101]
Lower supervisory and technical	0.844	[0.676,1.054]	0.782	[0.588,1.039]
Semi-routine and routine	1.064	[0.952,1.190]	0.877	[0.734,1.047]
Never worked	0.892	[0.664,1.199]		omitted
Mothers age (in years)	0.966***	[0.958,0.974]	0.965***	[0.955,0.976]
Sample child's birth order				
Subsequent birth				
First birth	1.181***	[1.092,1.278]	1.238***	[1.121,1.368]
Family status				
Couple household				
Single parent household	1.219**	[1.057,1.406]	1.384**	[1.112,1.724]
Mother's ethnic background				
Other				
White	1.071	[0.904,1.268]	0.845	[0.535,1.336]
Employment status at time of birth				
Full-time, employee				
Full-time, self-employed	0.841	[0.559,1.265]	0.859	[0.548,1.346]
Part-time, employee	0.826**	[0.735,0.929]	0.879*	[0.773,0.999]
Part-time, self-employed	0.632***	[0.487,0.820]	0.720	[0.501,1.034]
Not in work	0.632***	[0.554,0.720]		omitted
Leave from work (paid and unpaid)				
Still on leave at sweep 1				
None/up to 1 month			1.410	[0.946,2.102]
Over 1/up to 2 months			1.638*	[1.062,2.525]
Over 2/up to 3 months			1.509*	[1.054,2.159]
Over 3/up to 4 months			1.686*	[1.122,2.534]
Over 4/up to 5 months			1.502**	[1.149,1.965]
Over 5/up to 6 months			1.306	[0.995,1.714]
Over 6/up to 10 months			1.000	[0.756,1.324]

1. Data filtered for single-births and cases were mother was biological mother of child
2. Percentages are based on weighted data; N values are based on un-weighted data
3. Significance levels: * p <0.05, ** p <0.01, *** p<0.001

Discussion

The results suggest that employment is negatively associated with a mother's ability to breastfeed for prolonged periods of time among mothers in Scotland, confirming existing research in this field [9–11]. Those who do not work are more likely to breastfeed for longer. However, not all jobs are created equal, and among mothers working part-time, self-employed mothers breastfed for longer than mothers working as employees. In fact, self-employed mothers were just as likely to stop breastfeeding as mothers not in work. The most obvious explanation for this result is that self-employed mothers are more likely to work from home, where it is easier for women to juggle between breastfeeding and work-related tasks. As for employment leave, the results from the current study indicate that delaying the return to work may facilitate prolonged breastfeeding, confirming the findings from reviewed empirical evidence based on US samples [12, 13]. The risk of complete breastfeeding cessation is greater if returning to work when the child is younger. The findings resonate with extensive literature grounded in social theory which points to the conflicting demands that women face in juggling work and motherhood [27].

While the evidence seems to suggest a positive association between longer leave and breastfeeding duration the potential problem of sample endogeneity should not be overlooked. It is likely that mothers who aim for prolonged breastfeeding are distinct in their socio-economic and educational backgrounds as well as their self-confidence and aspirations. They might also have different job prospects, with different working conditions and work flexibility, and different patterns of return to work and of maternity leave take-up. Thus, the results may merely be reflecting a non-causal association between leave and breastfeeding, which is not being fully accounted for by the control variables included in the model. In terms of variables measuring social stratification, the results point to the superiority of maternal education as a predictor of breastfeeding duration, when compared to maternal social class. This has previously been observed in research looking at breastfeeding patterns in Scotland [22, 23]. Clearly, variables measuring social class or education are highly collinear, and are proxy measures for broader differences in human capital which nourish differences in breastfeeding trends. However, results suggest that a social-stratification system based on educational qualifications can go further in explaining differences in breastfeeding duration than an occupation-based social class distinction.

As previous research has shown, older mothers tend to breastfeed for longer [11, 18, 20]. This may be a result of more life-experience and more self-confidence, while older mothers are also more likely to be more educated and in better paid and more maternity-friendly types of employment. First-time mothers were more likely to give up breastfeeding sooner than mothers with other children and previous experience and confidence gained following the birth of the first child may explain why subsequent children are typically breastfed for longer. Single mothers were also more likely to stop breastfeeding sooner when compared to mothers in couple households [18], Single mothers have to face numerous demands of child rearing singlehandedly, and prolonged breastfeeding is harder to maintain for these mothers. Mothers categorised as belonging to non-white ethnic backgrounds were more likely to continue to breastfeed for longer compared to white mothers. Mothers from ethnic minorities might be benefitting from relatively more breastfeeding-friendly experiences, social attitudes and cultures when compared to other mothers [20].

The more cultural and emotional aspects of breastfeeding should not be ignored. Decisions on infant feeding are made on a backdrop of current social discourse which often portrays breastfeeding as the natural way [28]. A form of 'social anxiety' is created around the practise of breastfeeding, and mothers are pressured to secure the successful development of their child, for which breastfeeding is of paramount importance [27]. Maher observes how breastfeeding is presented as 'the panacea for the ills of childhood' [29]. Breastfeeding is also part of the social definition of good motherhood [30–34] and is linked to 'appropriate' gendered practice [35]. Infant feeding practices acquire independent meaning and morality which stigmatise deviant mothers who do not live up to the shared understanding of ideal motherhood [30, 36].

Reflections on Public Policy

After the first 6 weeks of Statutory Maternity Pay, the relatively ungenerous flat rate income of £124.88 is likely to leave mothers and families reliant on savings in order to maintain their standard of living. Returning to work is likely to be a more lucrative and realistic option for many mothers. A more generous maternity leave scheme, such as the Swedish one which pays 80% of the mother's average wage for the first 13 months of leave, may support mothers who want to breastfeed for longer. Thus, the proposal recently raised by the European Parliament to guarantee a minimum of 20 weeks paid maternity leave in EU countries would be highly beneficial in enabling mothers to, among other things, maintain prolonged breastfeeding with their infant [37], assuming, of course, that it does not backfire by making young women less employable in the first place. In light of current health policy recommendations and given that mothers are less likely to maintain prolonged breastfeeding when returning to work, further coordination between the breastfeeding targets set out in Scottish infant nutrition policy and the support offered to working mothers through employment policy may be appropriate.

Many women, however, do want to return to work, and they should be able to continue to work without feeling that this comes at a cost of any aspirations they may have as mothers. The data shows that mothers who are self employed and by default working under more flexible conditions, are more likely to maintain prolonged breastfeeding, and are not worse off than those not working at all. From a spatial and practical perspective, breastfeeding usually requires the mother and infant to be in close proximity throughout the working day, and this can easily be achieved if self-employed mothers are working from home. It would therefore be important to explore how facilitating this 'proximity' between mother and child could be achieved for mothers who are employees in larger business settings and working in traditionally less-flexible working environments. More work-based cre`ches and established maternal rights to more flexible working hours across all forms of employment could be a way of providing mothers with more time and resources to juggle the demands of both breastfeeding and work.

Breast-milk expression is one way in which the issue of mother–child proximity can be overcome. There is evidence to suggest that mothers who express milk are more likely to breastfeed for longer [38]. However, breast-milk expression still relies on someone being available to feed the baby expressed milk on behalf of the mother, and this is likely to entail paying for childcare. Also, evidence from the UK suggests that many mothers do not feel comfortable to either breastfeed or express milk while at work, many mothers feel they have to breastfeed or express milk in secrecy [39, 40]. Policies which facilitate milk-expression in the work place could be part of a broader policy portfolio, although a shift in the way breastfeeding is culturally perceived is likely to be necessary in order for work environments to become more friendly towards breastfeeding mothers.

The evidence suggests that maternity leave mediates some of the negative association between labour market participation and breastfeeding duration, stressing the importance of relevant policy initiatives addressing both employment conditions and employment leave. However, the above should be understood within the context of a wider unequal distribution of optimal feeding practises and related health inequalities in society. Breastfeeding duration was shown to be highly socially stratified by indicators of maternal education. Thus, policy initiatives which only aim to alter the working environment of mothers fail to address the fundamental social inequalities captured in part by indicators of maternal education, which shape the broader health behaviours of mothers and families. Addressing this underlying social stratification in society would be a way to address the real cause of the existing nutritional inequalities among infants in Scotland—and that would be a rather ambitious goal.

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Authors

This briefing was written by Valeria Skafida based on an unpublished MSc dissertation which explored differences in breastfeeding practice among Scotland's mothers in relation to their personal characteristics and their family circumstances. Please contact the author for further details on the methodology and results on v.skafida@sms.ed.ac.uk. It was edited by Jennifer Flueckiger, Sarah Morton and Fran Wasoff.

About this study

This study was completed using data collected for the Growing Up in Scotland (GUS) longitudinal study funded by the Scottish Government. GUS follows the lives of a national sample of Scotland's children from infancy through to their teens. This is one of the largest longitudinal studies ever done in Scotland and will provide information that will help develop policies affecting young children and their families in Scotland.

The study is following just over 8,000 children annually, until these children are aged 5. Of these, 5217 belong to the 'baby cohort' who were approximately 10 months old at the first interview, and 2859 were in the 'toddler cohort' who were approximately 34 months at the time of interview.

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Breastfeeding in Scotland:

the impact of advice for mothers

In the last two decades western societies have witnessed a new-found social and political interest in the promotion of breastfeeding. Scotland has recently passed legislation to make breastfeeding in public a right. However, breastfeeding remains controversial, and many mothers find it difficult or are reluctant to breastfeed. Research shows that breastfeeding is beneficial for babies and so is an important component in tackling health inequalities. This briefing outlines some of the key findings of a research project that investigated the impact of advice on increased take-up of breastfeeding among mothers in Scotland. It was based on the analysis of data derived from the Growing Up in Scotland (GUS) early years longitudinal study funded by the Scottish Government.

Key Points

- Mothers who received breastfeeding advice before birth were more likely to breastfeed (67%) than those who did not receive any advice (41%) regardless of age, education or anticipated feeding plans
- Mothers who attended all or most antenatal classes were much more likely to breastfeed than those who did not attend any classes and those who attended only some
- There was no significant difference in the likelihood of breastfeeding between mothers who attended only some classes and those who attended none
- 86% of mothers with degrees or equivalent, and 31% of mothers with no qualifications breastfed their infants
- Older mothers were more likely to have breastfed their babies than younger mothers

Policy context

There has been an increasing international interest in promoting breastfeeding for example from the World Health Organisation and the European Commission. Scottish policy concern with breastfeeding promotion began with the launch of the Scottish Joint Breastfeeding Initiative in 1990. In 1994, the Scottish Dietary Targets were announced, hoping to raise breastfeeding rates for the first six weeks from 30% to 50% by 2005. In 1995 a National Breastfeeding Adviser was appointed to work with Local Breastfeeding Initiatives in raising awareness regarding the benefits of breastfeeding. Simultaneously, the Scottish Breastfeeding Group was launched which established a website providing information for mothers (http://www.breastfeed.scot.nhs.uk/). In 2003, the Scottish Executive's An Integrated Strategy for Early Years focused on improving service provision particularly for vulnerable children from pre-birth to 5 years of age and their families, and increasing the proportion of women who breastfeed. In March 2005 the Breastfeeding etc. (Scotland) Act 2005 made it an offence to prevent a child under two years of age from being breastfed in a public place.

Objectives

The Scottish Government is promoting higher rates and longer duration of breastfeeding. This is primarily through education-based initiatives aiming to raise the awareness of the benefits of breastfeeding for both mother and child, and to facilitate the availability of breastfeeding information.

Previous research, predominately North American, consistently concluded that attendance at antenatal classes and receipt of breastfeeding advice raised the chances and duration of breastfeeding (Arlotti *et al* 1998, Kistin *et al* 1990, Ladas 1972, Libbus 1994, Matich & Sims 1992). This project explored whether awareness-raising breastfeeding initiatives influenced breastfeeding rates among mothers in Scotland. The aim of this briefing is to present its findings on the influence of receiving breastfeeding advice and attending antenatal classes on breastfeeding initiation.

Methods

GUS is a major longitudinal survey commissioned to aid policy makers in evaluating policy across a range

The term 'breastfeeding' is used to define a broad spectrum of practices, ranging from exclusive breastfeeding to mixed breast-and bottle-feeding (Carter 1995). The definition employed in this research is the 'initiation', or 'occurrence' of breast-feeding. This includes the very first milk (colostrum), and applies to all mothers who breastfed at least once.

of initiatives. GUS surveys parents and children annually and is funded between 2004 and 2010 by the Scottish Government's Education Department. The survey is conducted by the Scottish Centre for Social Research in collaboration with the Centre for Research on Families and Relationships (CRFR). This research project is based on an analysis of the first sweep of GUS data.

The current analysis is based on a total of 7796 mothers. Interviews are carried out with the main carers of children, predominantly (99%) mothers. Cases where the father was interviewed were excluded for the present research purposes. Mothers of multiple births and non-biological mothers were also excluded for this study.

The aim was to establish whether attendance at antenatal classes and receiving breastfeeding advice raised the likelihood, or, raised the odds of a mother having breastfed her child. Other characteristics of mothers were analysed at the same time in order to check that the observed effects of antenatal class attendance and receipt of advice were not being caused by other factors, such the mothers' education, her age at the time of birth, or her anticipated feeding plans.

The results of the analysis are reported as odds ratios, which compare the proportional odds of a group of mothers having breastfed (e.g. mothers receiving advice) to the breastfeeding odds of a reference category (e.g. mothers not receiving advice). The table below displays the five factors taken into account in the analysis and shows how breastfeeding occurrence is distributed for each of these factors.

Table 1 The rate of breastfeeding incidence by selected maternal characteristics

(single births, biological mothers, weighted sample)	Child was breastfed N	%
Mother's Education		
Degree or Equivalent	1752	86
Vocational qualification below degree	1683	59
Higher grade or equivalent	394	64
Standard grade or equivalent	572	40
No qualifications	233	31
Total	*4637*	*60*
Age of mother at birth of sample child (banded)		
Under 20	204	33
20 to 29	1747	53
30 to 40	2536	70
40 or older	160	73
Total	*4647*	*60*
Feeding method planned prior to birth		
Breastfeeding	4302	88
Bottle-feeding	110	5
No strong preference	233	47
Total	*4645*	*60*
If mother received breastfeeding help or advice		
Yes	3835	67
No	812	41
Total	*4647*	*60*
Mother's attendance at antenatal classes or groups		
Attended all or most classes	2012	73
Attended only some classes	548	65
Did not attend any	2087	51
Total	*4647*	*60*

Findings

As seen in the table below, older mothers, those with higher educational qualifications, and those attending antenatal classes and receiving breastfeeding advice were all more likely to breastfeed

- On average, 60% of the sample mothers initiated breastfeeding
- 86% of mothers with degrees or equivalent, and 31% of mothers with no qualifications breastfed their infants
- Older mothers were more likely to have breastfed than younger mothers
- 47% of mothers with no anticipated feeding plans initiated breastfeeding
- 67% of mothers who received breastfeeding advice compared to 41% of mothers who did not receive any advice breastfed their infant
- 73% of mothers who attended all or most antenatal classes initiated breastfeeding, compared to 65% of those who attended some and 51% of those who attended none

The analysis revealed that mothers who attended most or all antenatal classes had three times higher odds of having breastfed than mothers who did not attend any classes. However, there was no significant difference in breastfeeding chances between mothers who attended some classes and mothers who attended no classes at all. The results also indicate that the odds of breastfeeding for mothers who received breastfeeding advice prior to birth are twice as large as for those who did not receive any advice.

Results showed that the influence of antenatal class attendance and breastfeeding advice on breastfeeding practise is not being caused by other factors like maternal education, age when giving birth, or anticipated feeding plans. To clarify with an example, among two groups of mothers with the same age and level of education, the one group which received breastfeeding advice would be more likely to breastfeed than the group which did not receive advice, and we could say the difference in likelihood of breastfeeding is not being caused by differences in the mother's education or age.

It is important to note however that other research has shown that older mothers and those with higher educational qualifications are nevertheless more likely to attend antenatal classes in the first place (Anderson *et al* 2007).

Discussion

Previous research primarily conducted in North America consistently indicated that attendance at antenatal classes and receipt of breastfeeding advice raised the initiation and duration of breastfeeding. Similarly for Scotland, these results revealed that, even when controlling for education, age, feeding plans, and antenatal-class attendance, mothers who received breastfeeding advice prior to birth were more likely to breastfeed than those who did not receive any. Mothers who attended antenatal classes were much more likely to breastfeed their infants than those who did not attend, regardless of the impact of education, age, feeding plans and breastfeeding advice. However, no significant difference was found for those who attended only some classes and those who attended none.

These findings support the information-based approach to increase general health awareness and breastfeeding rates. The present findings suggest that these measures are related to a higher likelihood of breastfeeding initiation for mothers at all educational levels and ages.

However, while attending all or most antenatal classes was found to improve breastfeeding odds, this was not true for mothers who only attended some classes. From a policy perspective, it is particularly important to encourage mothers to attend classes regularly, as it is regular attendance which is associated with higher breastfeeding rates. It would therefore be important to understand the reason why some mothers only attend some of the classes or none at all.

Irregular or partial attendance at antenatal classes may be related to the classes not being available within reasonable proximity or not being available at times which suit unusual or busier schedules. It may also be a result of the class content not being helpful or responsive enough to the needs of some mothers. Furthermore, while complete non-attendance might be due to attendance at classes for previous births, it may also be related to the problems in meeting travelling or childcare costs, or simply related to the lack of availability of classes, or the lack of awareness that classes exist. Questions regarding the usefulness of classes for the attendees and class non-attendance have been asked in the GUS survey leaving scope for further research in this area.

While this research emphasises the importance of antenatal help and advice, evidence from qualitative research suggests that advice before pregnancy is often not followed up with advice after pregnancy when problems often occur (Carter 1995). Improving the provision and quality of post-natal breastfeeding help and advice is important for mothers who may find they have no one to turn to for advice or support.

Recommendations

More research is needed to find out why some women do not attend ante-natal classes, or only attend a few, and to address this as part of a strategy to increase breastfeeding rates

This briefing reports on initiation of breastfeeding. More research is needed on continuing breastfeeding and the support required for this.